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Engineering News-Record

Repairing the Washington Monument

National Resources Board Report

Short Articles from Job and Office

Continuous Beam Design by Direct Distribution

Old Swing Span Moved for Road Detour

Road Research in a Wisconsin County

Removing Trainshed Roof Trusses

Construction League Outlines New Program

Tubular steel scaffolding, completely enclosing the 555-ft. Washington Monument, gives access for first cleaning and repair job in half a century

Your help is wanted in a matter that concerns the entire construction industry

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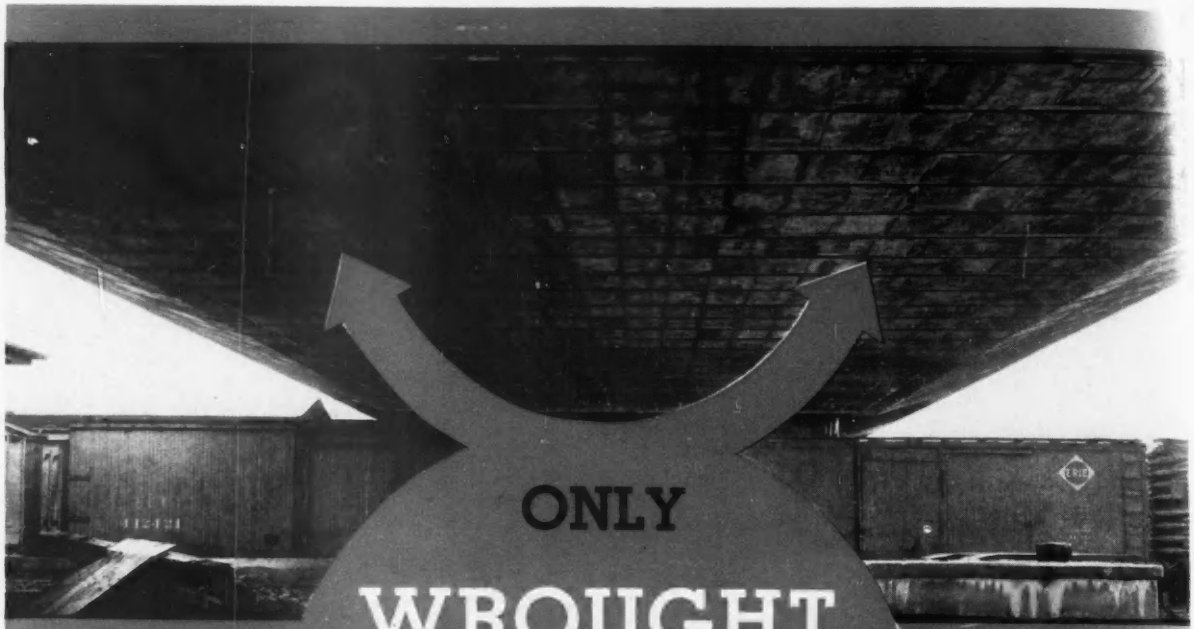

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THE need for protecting bridges over tracks from sulphur laden blasts is obvious. The question is — what to use? And in answer we present another instance where railroad and city officials, after studying wrought iron's service record, have joined in specifying it for blast plates.

Whether it is new construction or maintenance, engineering facts point to but one material for bridge protection — i. e. wrought iron. Illustrated is the Louisiana Street Bridge in Buffalo over the New York Central, Lehigh Valley and Erie Railroad tracks. Sixty-two hundred square feet of ½" Byers Wrought Iron plates, fabricated by the McManus Steel Construction Company, Buffalo, protect the entire under surface from locomotive blasts.

Other applications of wrought iron on bridges — such as cover plates, track troughs, bridge railings, drainage lines and downspouts — are illustrated and described in an interesting report compiled through the friendly aid of leading bridge engineers. This report, together with other facts and data, is available through any Byers Engineer or our Engineering Service Department.

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Once Again, Relief or Recovery?

IN a recent issue of the *New York Herald-Tribune,* Walter Lippmann considers a matter that has often been discussed on this page. He tries to reconcile and if possible to combine governmental efforts in behalf of relief and recovery.

Much of his analysis is sound, especially when he points out the danger of doling out relief merely to keep body and soul together; he sees that the relief that is cheapest from a pecuniary aspect is also the most demoralizing to its recipient. He sees also the need for administering relief and recovery measures with due regard for their effect upon each other.

But in advancing a solution Mr. Lippmann fails, as others have done, to visualize construction as an industry and to appreciate the effect of certain relief measures upon that industry. He suggests, for example, a policy "exemplified by the CCC and the CWA," which, as he puts it, "provide jobs for the unemployed on public works that do not call for large investments in land and in machinery."

He objects to a public works program on the ground that it takes too long to get started, that it does not offer quick relief, that its maximum effects might come in the future when they would not be needed, that present wages and prices are too high and that it "does not really prime the pump. All the water that comes out of the pump," says Mr. Lippmann, "is what the primers have poured into it."

As opposed to all this he offers the startling statement that the CWA program as practiced last winter did prime the pump "while it was operating." This writer cannot distinguish between priming the pump "while it is operating" and "having no water come out of the pump but what the primers have poured into it." Certainly a public construction program can prime the business pump only in proportion as it stimulates a resumption of capital investment; thus only can we revive employment in those many industries which produce the materials and equipment of construction and in which we find the great bulk of current unemployment. How this will be accomplished by a policy that deliberately excludes the purchase of durable goods Mr. Lippmann does not make clear.

This writer is mindful of the relief value of CCC and CWA projects; it is important, however, to administer them so as not to interfere with a program of public works construction organized and prosecuted in the interest of industrial recovery rather than direct relief. Mr. Lippmann sets out to determine "how to combine relief and recovery," and ends by throwing recovery overboard. He suggests a program of "work relief" that would almost certainly insure a serious setback to the recovery now under way in the construction industry with the help of the public works program.

It is interesting to observe that he qualifies his endorsement of CWA by certain provisions which, if met, would answer also some of his major objections to the public works program. He cites the inflated wage rates that operated to maintain uneconomic scales and refers to the delay in developing good projects. He thinks that these difficulties could easily be remedied in a new CWA program, but he fails to recognize that it would be still easier to correct them in the present PWA, a going concern.

To accomplish Mr. Lippmann's original purpose of reconciling relief and recovery there is but one practical course. That is to have a relief program for relief and a public construction program for recovery. Experience has taught us that the relief program must not be permitted to invade and complicate that field of public works construction which now is available to the normal functioning of the construction industry. The purpose of a public works program is to foster recovery by using the public credit to sustain the process of capital investment until such time as increasing confidence leads private capital into the construction market. This calls for a sound public works program operated with no taint of relief psychology.

Mr. Lippmann's program would scuttle the recovery of the construction industry in the interest of direct relief, turn back the recovery clock and gamble on the speed with which private enterprise will be ready and able to go in for substantial construction.

Willard Chevalier

ENGINEERING NEWS-RECORD

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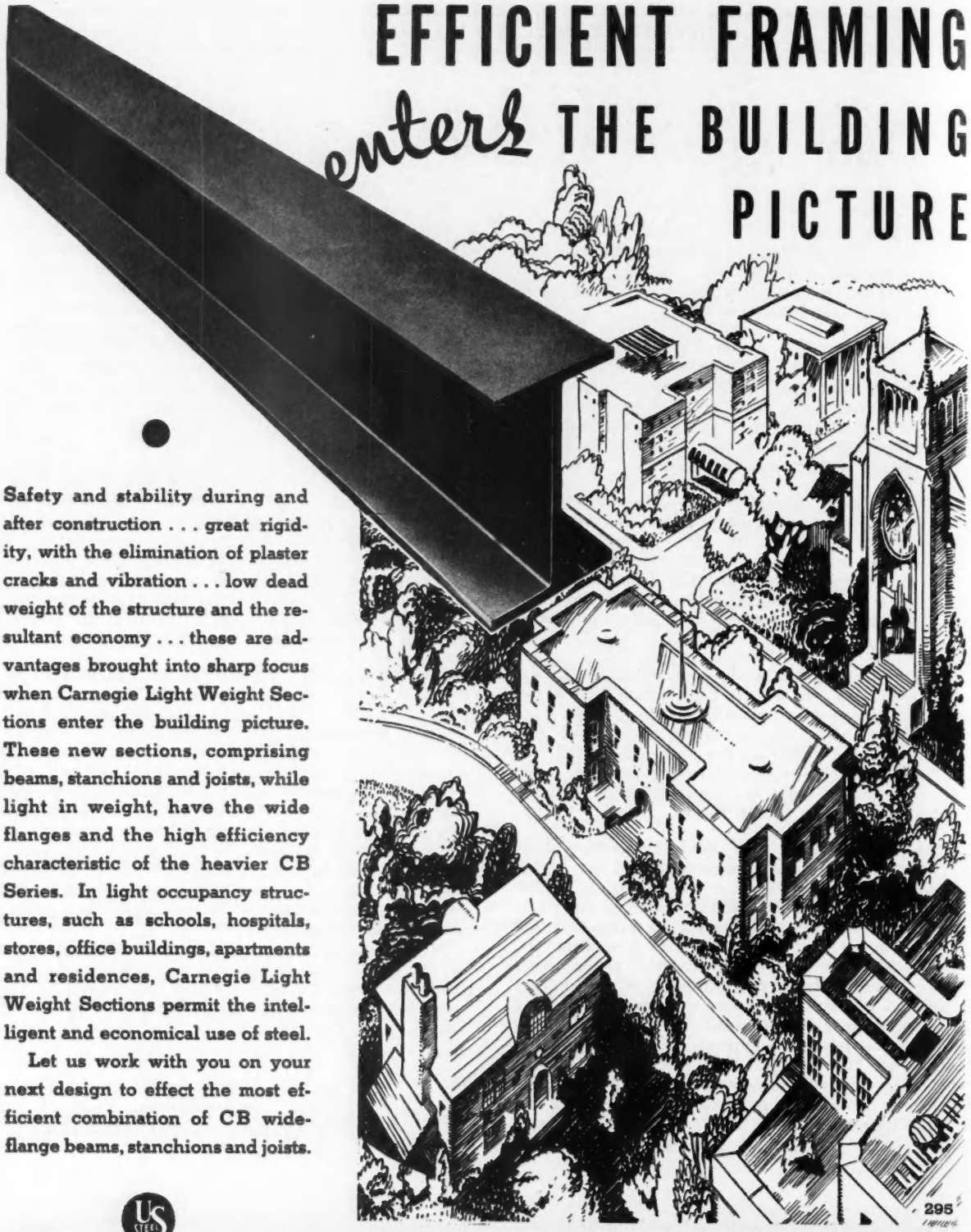

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In the News:

CREATION of the position of Under-Secretary of the Interior, to aid in the administration of the department, has been recommended by Secretary Ickes to President Roosevelt. Washington observers see in this move plans for a furthering of a PWA program of considerable magnitude again headed by Henry M. Waite.

A MASTER PLAN for grade crossing elimination projects is being prepared by the new Association of American Railways.

NEW YORK CITY has leased the North Beach Airport on Flushing Bay, Long Island Sound, and the park department is developing plans for a highway connection to the new Grand Central Parkway, over which mail trucks can reach Manhattan in ten minutes via the Triborough Bridge.

THE FEDERAL HOUSING ADMINISTRATION has issued a set of rules governing insurance of mortgages on so-called speculative or developmental residential buildings Heretofore, the builder-developer has not been encouraged too openly or enthusiastically by the government body.

THE RESIGNATION of Jay Downer as chief engineer of the Westchester County Park Commission recalls the original parkway, Bronx River Parkway, of 1912, for which Mr. Downer was chief engineer. This was the forerunner of the Westchester Parkway system, a model for all modern parkways.

NEW YORK'S ELEVATED HIGHWAY along the Hudson River, originally planned to be carried above the New York Central tracks north of 72d St., may be moved nearer the river bank and constructed at grade from 86th St. north. Studies are being made to this end by the railroad company and the park department. A great saving would result from the change, it is claimed.

TO THE LIST of national consulting bodies has been added the Housing Advisory Council of 25 members created by James A. Moffett, FHA head, to bring technical opinion on construction and finance to the aid of the government-sponsored private housing program.

WEST COAST LUMBERMEN, at a public hearing on the lumber code, advocated suspension of price-fixing or regulating provisions in their territory, stating that the code-price structure had already collapsed on the West Coast.

FORTY MILES OF TUNNEL remained to be driven on the main Colorado River Aqueduct on Dec. 1. The figures were: driven, 51.94 miles; aggregate length of tunnels, 91.94 miles.

In This Issue:

TO CLEAN AND REPAIR the famous Washington Monoment in the national capital, a tubular steel scaffolding containing 35 miles of pipe has been erected. The design and erection of this 555-ft. scaffold is described.

A NEW continuous-beam analysis method is offered in which the authors state, "the fixed-end moments (considering one loaded span at a time) are released and directly and finally distributed in one operation into the remaining, then unloaded, spans."

AN EXPENSIVE highway-detour job in Massachusetts required the moving of an old 600-ton swing-span bridge, which was lifted onto scows, floated to a new position and seated by tide movement.

A FIELD RESEARCH PROGRAM made possible substantial savings in a three-year road building program in Sheboygan County, Wis. The study of concrete mix, batching, aggregate and compacting by rolling are reviewed, and the results in cost reduction and durability factor are summarized.

TENTH IN THE SERIES of sewage-plant surveys, data are presented on the two plants at Akron, Ohio, which utilize Imhoff tanks and trickling filters.

THE PROBLEM of removing the old arch trusses of the LaSalle St. Station, Chicago, after the completion of the new flat roof, was solved by a large steel-frame traveler mounted on the new roof. The traveler and the dismantling operations are described.

THE OBJECTIVES and a tentative program of emergency and permanent activities of the Construction League of the United States were presented at the recent Knoxville meeting. This program, as reviewed in this issue, is now out for discussion and criticism.

LONG-RANGE PLANNING for the use and development of natural resources of land, water and minerals is proposed to the President in the report of the National Resources Board, the first part of which was made public on Monday. Public works as a means of flattening out depressions in business cycles are discussed, and the establishment of a permanent Public Works Administration is proposed.

Floors of quiet charm - in fine terrazzo

This fine terrazzo floor in the Worcester, Mass., Memorial Building was made with Atlas White portland cement. Installed by De Paoli Mosaic Co., Boston. Lucius W. Briggs, Worcester, and Frederick C. Hirons, N. Y. C., associated architects.

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ENGINEERING NEWS-RECORD

December 20, 1934

Tubular Steel Scaffold for Repairing Washington Monument

Temporary structure built for cleaning and repair of famous stone column requires 600 tons of steel, including 35 miles of pipe—Windbraced by horizontal steel trusses—Hoist serves as elevator

AFTER a half century of exposure to the elements, the white marble exterior of Washington Monument is being cleaned, repointed and repaired. These operations required access to the entire face of the 555-ft. shaft, from base to apex of the pyramidion capping the structure. To obtain this required access, the contractor utilized standard tubular-steel scaffold parts in combination with specially designed structural-steel sway trusses and setback framing, to produce an integral structure completely surrounding the high stone column. The result is a steel structure of great rigidity, yet easy to erect and dismantle. Thirty-five miles of pipe, weighing 450 tons, 150 tons of structural steel and 100 tons of wood plank and miscellaneous material make up the 700 ton dead load of the tower. Another 50 tons is estimated for live load. A contractors' hoist on the outside of the tower serves as an elevator for men and materials.

The monument tapers from 55 ft. 1½ in. square at the base to 34 ft. 5½ inches square at the 500-ft. level, and is capped with a 50-ft. pyramidion. For the lower 150 ft. the walls are 15 ft. thick, of bluestone faced with white marble, both laid in lime mortar. Above the 150-ft. level the shaft walls are thinner, consisting of granite backing and marble facing set in portland cement mortar, with the granite giving way to solid marble toward the top. The pyramidion is of 7-in. marble slabs on structural supports. Lightning, weathering, temperature changes and vibration have damaged the facing, resulting in cracking and spalling of the marble and deterioration of joint-filler material. The current repair work is to prevent further serious disintegration of the monument.

Plans for repairs contemplate replacement of lightning-shattered stone at the top, with repair to the lightning-rod system. Decision has not yet been made as to whether damaged stones below the 150-ft. level will be repaired or replaced. Treatment of the joints consists of cutting and repointing a ¼-in. channel 1¼ in. deep in all vertical and horizontal joints in the masonry up to the 150-ft. level. Above this elevation all joints in bad condition are being raked out and repointed. The entire face is being given a soap and water scrubbing with stiff fiber brushes. Repairs to the masonry backing consist of drilling 2½-in. holes at various points from the inside, through which cement grout is poured, to fill voids in the walls.

Scaffold design

Steel scaffolding was specified for this job. Two factors complicated the design: the unusual size and height of the tower, necessitating special bracing to provide rigidity and to resist wind stresses; and the batter of the faces of the monument, requiring setbacks in the tower structure. These requirements were met by combining standard tubular scaffold parts with special structural-steel framing, the first by horizontal sway trusses and the second by vertical trusses and I-beam caps supporting set-

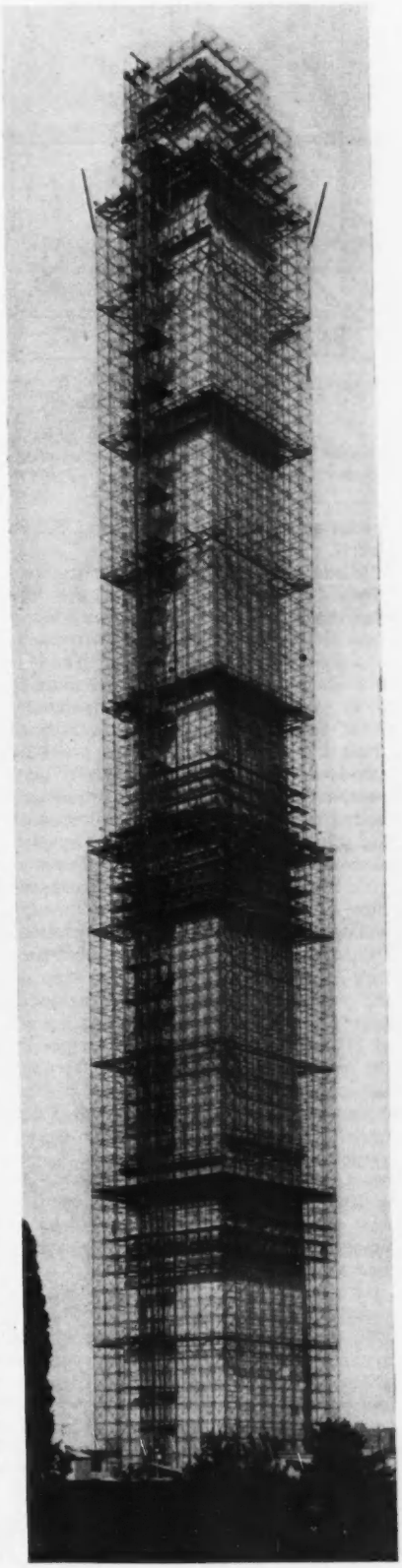


FIG. 1—HIGH tubular-steel scaffold completely surrounds the famous Washington Monument for washing and repair operations.

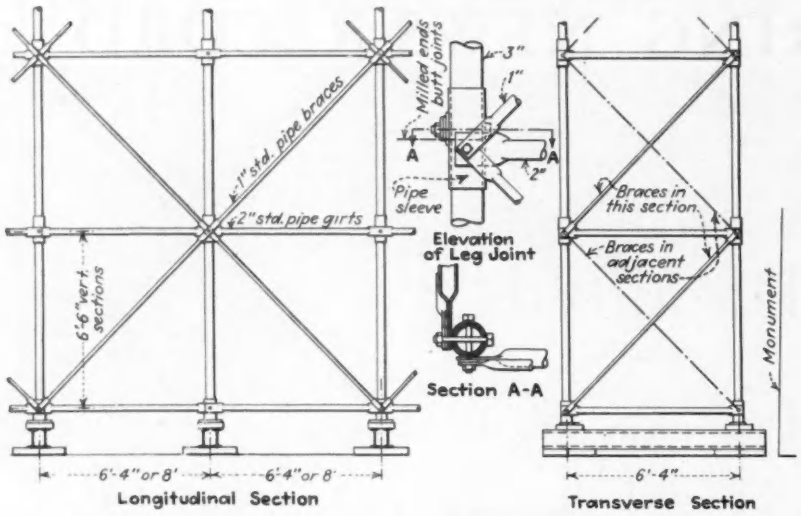


FIG. 2—TYPICAL FRAMING of 450 tons of tubular scaffolding required to surround the monument. Another 150 tons of structural steel was used as setback framing and for windbracing.

backs at the 250-ft., 500-ft. and 525-ft. levels.

The tower consists of 84 vertical sections (6½-ft.) carried by 78 pipe legs varying from 3-in. double extra-heavy pipe at the lower corners to 2-in. standard pipe in the upper sections. The legs are spaced 6 ft. 4 in. and 8 ft. apart in double rows 6 ft. 4 in. apart. Horizontal 2-in. girts define the vertical sections of the tower. Diagonal bracings are 1-in. standard pipe. All brace and girt connections have flattened ends and are bolted to the vertical legs. All post or leg joints are end-bearing, held by pipe sleeves through which the braces and girts are bolted. Details of standard sections are shown in Fig. 2.

The load of the scaffold is transmitted from the vertical members of the structure to the sidewalk around the base of the monument by an I-beam grillage, providing a fairly uniform distribution of all vertical loads over the surface of the sidewalk. The necessity for keeping the entrance on the east side of the monument in free and uninterrupted use required special steel members to be placed two scaffold sections above the base to support the posts affected. An underground machinery room on the west side of the monument required a support of two 24-in. I-beams spanning four scaffold bays.

Horizontal sway trusses are placed every eight vertical sections (50 ft.). They are set in a horizontal plane within the scaffolding and are held in position on the vertical posts with standard scaffold clamps (Fig. 5). These trusses are designed to transmit all wind and lateral stresses from the individual vertical bents to the side bents of the integral scaffold tower thus created. Adjustable wood struts were wedged between the monument and the scaffold at each corner where the sway trusses occur, to protect the monument against swaying of the scaffold. At no point was the metal work permitted to be closer than 6 in. from the face of the monument. The additional horizontal wind load on the shaft was less than 5 per cent.

At the 250-ft. level the scaffold bents are capped with I-beams, which support the outside posts above this level. The inside posts are supported by steel trusses running parallel to the four faces of the monument, the trusses on the east and west sides framing into those on the north and south sides. The maximum end reaction from the latter trusses totals 97,000 lb., which is distributed through a grillage to four scaffold posts (Fig. 3). The maximum load on a scaffold post due to this reaction equals 43,000 lb. Neglecting some distribution of this load through the bracing system, the maximum load on this post at the base of the structure becomes 50,000 lb. These loads were used for design purposes and are highly conservative, as some of the weight is distributed through the bracing system to adjacent posts. Actual extensometer tests on previous structures built of this material indicate that the effect of a concentrated load on one post will be equalized approximately twenty sections, or 130 ft., below the point of application. The setbacks at the 500- and 525-ft. levels, involving smaller loads, were treated in a similar manner.

Hoist serves as elevator

The specifications called for a passenger elevator, to provide access to the working platforms up to the 500-ft. level, all elevator equipment to be designed and erected in accordance with the regulations for construction and repairs issued by the Commonwealth of Pennsylvania, Department of Labor and Industry. Utilization by the contractor of an ordinary builder's hoist for operating the elevator car and the adaptation of standard elevator rails, cars and safety devices to the skeleton shaft, which was an integral part of the scaffolding, met all the code requirements in a most satisfactory manner. The elevator car, equipped with a standard safety sling, is of all-steel construction and has collapsible gates on two sides with electrical contacts. Standard 15-lb. guide rails are used. A speed governor set at 200 ft. per minute prevents overspeeding, and normal and final limit switches are installed at the top and bottom of the hatch. Two slack cable switches and a traveling-cam limit switch on the hoist are additional safety features.

Two separate ⅝-in. steel cables, reeved double, lift the car. Hoisting power is supplied from a two-drum, 60-hp. electric hoist, equipped with solenoid brake, having both drums geared directly to the motor, so that neither drum can move in either direction without power applied. Permanent elevator landing platforms are placed at every third scaffold section, while steel ladders, running the en-

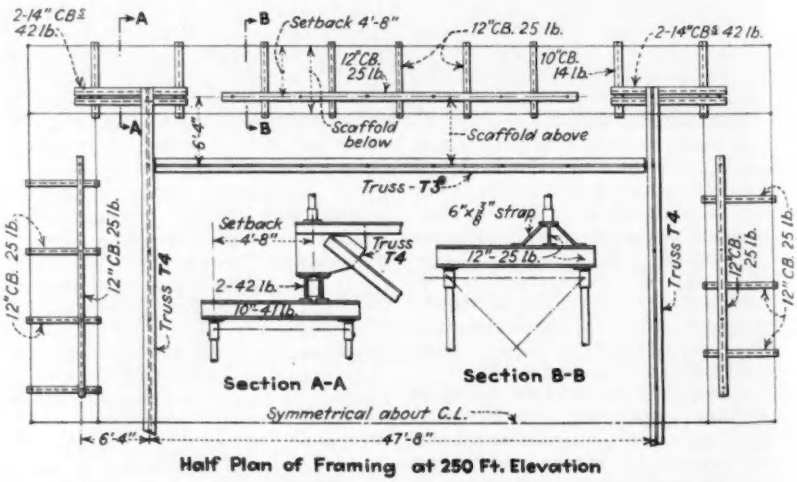


FIG. 3—DETAILS OF SETBACK FRAMING at 250-ft. level. Steel trusses carry the inside legs of scaffold above this elevation.

tire height of the scaffold, provide additional access to the working platforms. At each landing the elevator shaft is protected with a vertical-type, semi-automatic, wood gate so arranged that the gate cannot be opened unless the car is at that landing; it will close and lock automatically when the car leaves. A signal man rides the car at all times and signals the hoisting engineer on the ground by a two-way telephone and electric bell. A pushbutton is also provided on each landing platform.

Erection

From the time the drawings were approved, the scaffold and elevator were erected complete, without any lost-time accidents, in 35 working days. Two 20-ft. Chicago booms, erected on diagonally opposite corners of the scaffold, were used for hoisting the material to working level. These booms, of 2-ton capacity, were designed with special scaffold fittings to minimize erection and dismantling time. The scaffold material was shipped from the warehouse in convenient bundles weighing approximately 1½ tons, and was hoisted in this form to the working levels. All special structural framing was designed with field-bolted joints and connections, to facilitate handling and erection. All bolts were treated with a rust-preventive oil, which will not only aid in making the structure easier to dismantle but also affords a protection to the monument against rust stains during the repair period.

Work is conducted from five permanent platforms, placed at 100-ft. intervals, and from movable platforms, both of the cantilever and hanging type. All platforms are 2-in. fireproofed lumber and are equipped with toeboards, handrails and wire-netting protection.

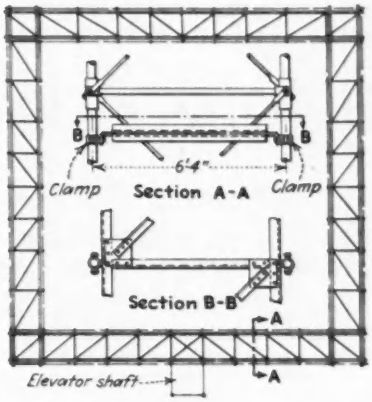
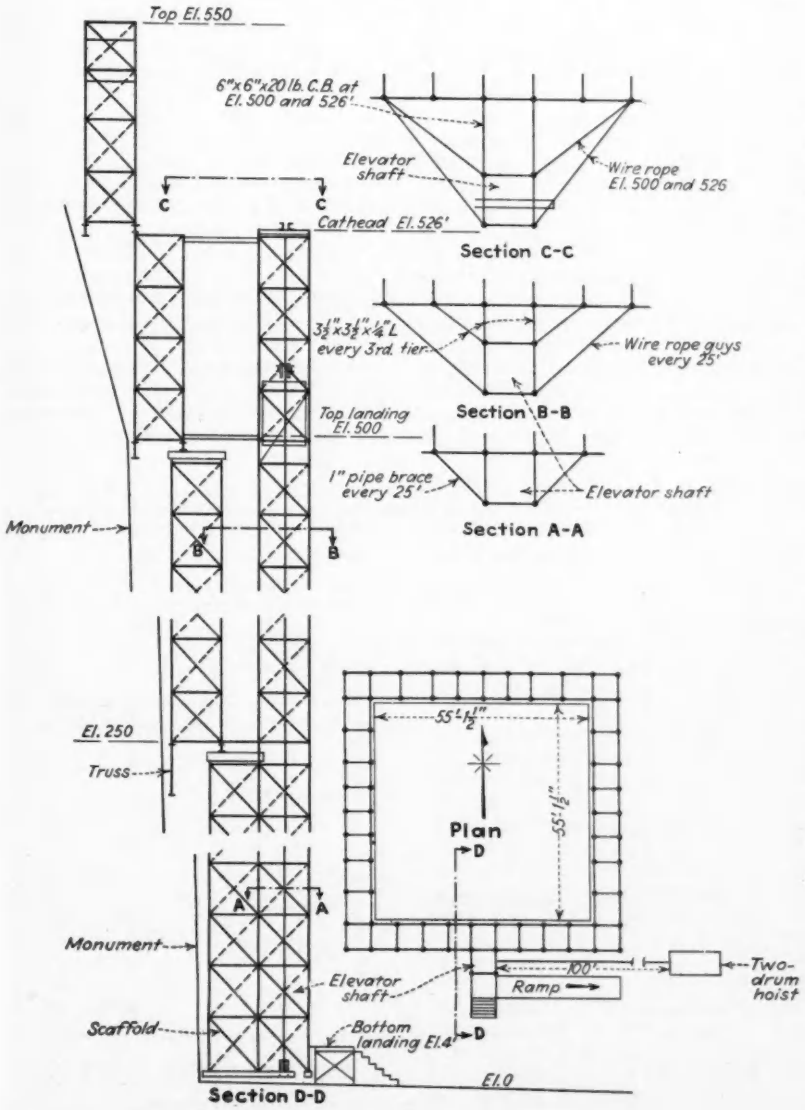


FIG. 5—HORIZONTAL steel trusses every 50 ft. provide windbracing to stiffen the high tower. Detail shows connection of trusses to pipe scaffold.

FIG 4—DIAGRAMMATIC SECTION OF TOWER, showing setbacks and elevator-shaft framing.



Progress of work

By the time the scaffold was erected to the 250-ft. elevation, channeling operations had commenced at ground level. Before the scaffold reached the top, channeling operations were being conducted at three elevations up to the 150-ft. level, and raking out of the joints was started at this elevation. All raking and cutting out of the joints is being done with electric rotary hand-saws equipped with thin grinding wheels. Cleaning and scrubbing operations have started at the top, and as cleaning progresses downward the scaffold will be removed, at least to the 150-ft. level. A change in plans in repairing stone below this elevation may necessitate maintaining the lower scaffold for some time.

PWA project

Cleaning and repair of the monument is a PWA project, executed through the U. S. Department of the Interior, National Park Service. John L. Nagle, assistant chief engineer of the National Park Service, is directing the work. The general contract for the scaffolding, as well as the cleaning and repairing of the monument, is held by Alexander Howie, Inc., stone-setting contractors of Cleveland. For the contractor, Alexander Ewan, vice-president, and George S. Merts, engineer, are in charge. The steel scaffolding was designed and pipe material furnished by the American Tubular Elevator Co., Pittsburgh. The steel trusses and special windbracing were newly fabricated by local concerns, while the grillage and other steel framing was refabricated from steel that the contractor had on hand. All erection was done by the Howie organization.

Information for this article was largely furnished by Mr. Merts and C. Perry Streithof, chief engineer of the American Tubular Elevator Co.

Continuous-Beam Analysis by Direct Distribution

Fixed-end moments distributed in one operation, analytically or graphically, by use of easily determined coefficients for induced and reduced moments

By John C. Schulze and William A. Rose
Assistant Engineers, New York Central R.R. Co., New York, N. Y.

THE ANALYSIS of continuous beams has in recent years occupied increasing importance in the technical literature of structures. In the rapid and exact method of analysis presented here the fixed-end moments (considering one loaded span at a time) are released and directly and finally distributed in one operation into the remaining, then unloaded, spans. From a consideration of the conditions of continuity of the beam, determined from its geometry, coefficients are derived which, when multiplied by the fixed-end moments, give the released moments at the ends of the loaded span. Coefficients are also determined for the ends of the unloaded spans in such a manner that the coefficient at any support will give the induced moment at that support when multiplied by the released or induced moment at the next preceding support.

The writers believe that the extreme simplicity of the formulas and method, the ease with which the live and dead loads or any component part thereof may be separately analyzed, the manner of determining maximum moments by loading alternate spans which is made possible without additional computation, and the ready adaptability of the method to all problems in continuity, are the merits which have led a number of engineers to adopt the method since it was first developed over a year ago and now to employ it as their only tool in the analysis of continuous beams and frames.

The analysis of a four-span continuous beam is presented below in which the method of procedure is explained in detail. The computations required for each step are given, and the work is arranged in simple and logical sequence. Free and fixed-end spans, unequal moments of inertia, and eccentricity of loading, in addition to unequal span lengths, have been introduced in order that practically all the conditions encountered in ordinary practice may be covered. The problem and the tabulation of the computations, involving five steps, are shown in Fig. 1. Lack of space precludes presentation of the mathematical derivation of the simple equations given below, but it may be stated that the derivation is based on the principle of area moments utilizing the methods of Fidler as demonstrated in this country by Prof. F. E. Richart of the University of Illinois.

Computation of stiffness ratios—Step 1

By the term "stiffness" is meant the measure of the ability of a beam to resist flexure, which is equal to kEI/L, where k is a constant dependent on the physical characteristics of the beam. In this problem we are only concerned with the ratios of the stiffnesses of adjacent spans having the same physical characteristics. The ratio of the stiffness of any span n to that of the immediately preceding span m then reduces to:

$$r_n = \frac{I_n L_m}{I_m L_n} \qquad \text{(A)}$$

Referring to Step 1 of Fig. 2, the stiffness ratios, working first from left to right, and then from right to left, are computed as follows:

$$r_2 = \frac{100 \times 24}{200 \times 18} = 0.667,$$

$$r_3 = \frac{100 \times 18}{100 \times 10} = 1.800$$

$$r_4 = \frac{50 \times 10}{100 \times 10} = 0.500$$

$$r'_3 = \frac{1}{r_4} = 2.000$$

$$r'_2 = \frac{1}{r_3} = 0.556$$

$$\text{and } r'_1 = \frac{1}{r_2} = 1.500$$

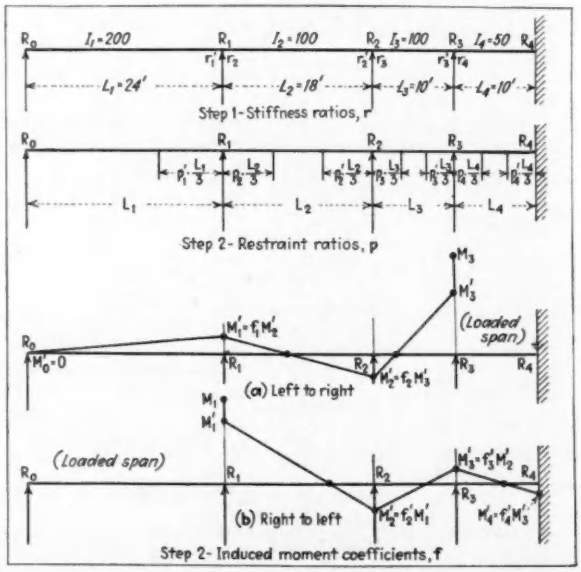
Restraint ratios and induced moment coefficients—Step 2

If complete fixity of the end of a span be regarded as a restraint of unity, then the restraint developed by continuity will have some ratio to this, which we

FIG. 1—TABULATION of the design steps necessary in analyzing a four-span continuous beam by the method of direct moment distribution.

			W = 1,200 lb. per ft.				10,000 lb. 5′	5′	6,000 lb. 6′	4′	
Span length	L_n	$L_1 = 24'$			$L_2 = 18'$		$L_3 = 10'$		$L_4 = 10'$		
Moment of inertia	I_n	$I = 200$			$I_2 = 100$		$I_3 = 100$		$I_4 = 50$		
Step 1	r_n			1.500	0.667	0.556	1.800	2.000	0.500		
Step 2	p_n	0.000		0.545	0.692	0.750	0.495	0.500	0.769	1.000	
	f_n	0.000			0.300	0.333	0.198	0.200		0.500	
Step 3	M_n		-57,600			-32,400		-22,500		-10,000	
	M_u								-5,760	-8,640	
Step 4	m_u								0.417	1.125	
	m_n	0.000		0.666	0.666	0.778	0.494	0.501	0.624	1.188	
Step 5	⊕ L_1	0	⊕	-38,400		+ 12,800		-2,560		+1,280	
	L_2	0			-21,600	⊕ -25,200		+5,040		-2,520	
	L_3	0			+3,330		-1,100	⊕ 11,300		+5,650	
	L_{43}	0			-370		+1,240		-620	⊕ -11,880	
	L_{4u}	0			-220		+710		-360	⊕ 9,720	
Total moment	M'	0		-57,300 ft. lb.		-21,600 ft. lb.		-18,700 ft. lb.		-17,280 ft. lb.	

FIG. 2—DIAGRAMS illustrating the stiffness ratios, the restraint ratios and the induced moment coefficients whose determination constitutes steps 1 and 2 of the procedure.


Step 1- Stiffness ratios, r
Step 2- Restraint ratios, p
(Loaded span)
(a) Left to right
(Loaded span)
(b) Right to left
Step 2- Induced moment coefficients, f

may denote by p. Then for a fixed end, $p = 1$, and for a free end, $p = 0$. However, the ends of a beam are never entirely fixed or free, so that the judgment of the designer is the factor which determines the accuracy of the assumed values for p at the ends of the beam.

If the restraint ratio for the left end of one span is known, the ratio for the left end of the adjacent span to the right may be determined from it by considering the relative stiffnesses of the two spans. If the first span be m and the adjacent span to the right be n, then:

$$p_n = \frac{c_m}{c_m + r_n} \quad \text{(B)}$$

$$\text{where } c_m = \frac{3 - p_m}{2 - p_m} \quad \text{(C)}$$

A similar relationship exists between the restraint at the right end of any span and the restraint at the right end of the adjacent span to the left. In Fig. 2, the first diagram for Step 2 shows the location of the fixed points for a beam with restraint ratios p'_1, p'_2, etc.

Referring to the second diagram for Step 2 (Fig. 2), let M_2 denote the fixed-end moment over support R_2 when the right-hand span is loaded and the remaining spans are not loaded. When this end is released, the moment will be reduced to some value M'_2, and at the same time a moment M'_1 will be induced by continuity at support R_2. This in turn will induce a moment M'_1 at support R_1. These moments will alternate in sign, and each may be determined from the preceding one by means of a coefficient f, which represents the amount of the moment at one support which will be induced at the next. The induced moment coefficient at the end of a span is a function of the restraint at that end. In general, the induced moment is $M'_m = f_m M'_n$

$$\text{where } f_m = -\frac{p_n}{3 - p_n} \quad \text{(D)}$$

The diagram also illustrates the induced moments when the left-hand span is loaded and the remaining spans are not loaded. The computations for the restraint ratios and the induced moment coefficients follow:

Working from left to right:

$p_1 = 0$, since the left end is free.

$$c_1 = \frac{3-0}{2-0} = 1.500, \quad p_2 = \frac{1.500}{1.500 + .667} = 0.692,$$

$$f_1 = -\frac{.692}{3 - .692} = -0.300$$

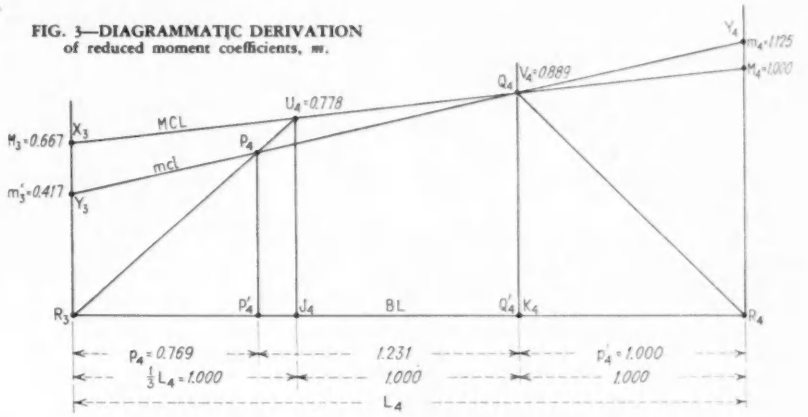
$$c_2 = \frac{3 - .692}{4 - .692} = 1.765, \; p_3 = \frac{1.765}{1.765 + 1.800} = 0.495,$$

$$f_2 = -\frac{.495}{3 - .495} = -0.198$$

$$c_3 = \frac{3 - .495}{2 - .495} = 1.664, \; p_4 = \frac{1.664}{1.664 + .500} = 0.769,$$

f_3 is not required.

FIG. 3—DIAGRAMMATIC DERIVATION of reduced moment coefficients, m.



Working from right to left:

$p'_4 = 1$, since the right end is fixed, and

$$f'_4 = -\frac{1}{3 - 1} = -0.500,$$

$$c'_3 = \frac{3-1}{2-1} = 2.000, \; p'_3 = \frac{2.000}{2.000 + 2.000} = 0.500$$

$$f'_3 = -\frac{.500}{3 - .500} = -0.200$$

$$c'_2 = \frac{3 - .500}{2 - .500} = 1.667, \; p'_2 = \frac{1.667}{1.667 + .556} = 0.750,$$

$$f'_2 = -\frac{.750}{3 - .750} = -0.333$$

$$c'_1 = \frac{3 - .750}{2 - .750} = 1.800, \; p'_1 = \frac{1.800}{1.800 + 1.500} = 0.545$$

f'_1 is not required

It should be noted that the denominator for any f value becomes the numerator for the next c value, while the same quantity diminished by one becomes the denominator; that this c value becomes the numerator for the next p value, and that this p value becomes the numerator for the next f value. The indicated additions and subtractions may be performed mentally, so that the entire group of values may be determined by simple settings of the slide-rule, a fact which greatly facilitates the solution of the problem. Although the computations in this paper have been extended to three places of decimals, it will be found that for all practical purposes two places are sufficient. The errors will be considerably smaller than those resulting from the non-conformance of the physical properties of the material to the assumptions of elastic theory.

The major advantage of this method lies in the simplicity of the above arrangement, coupled with the fact that, once the f values are determined, the induced moments at the ends of the unloaded spans may be found immediately from the reduced moment at the end of any loaded span. In any other method, the analytical determination of the moments induced by loading spans separately involves a duplication of practically all computations. In the average case, the problem is not to find the effect of all loads on the moment at a given support, but rather to find the maximum moment due to any possible combination of loads.

Step 3 involves computation of the fixed-end moments M_s for the symmetrical loads on all spans, and the fixed-end moments M_u for the unsymmetrical loads. These values are tabulated in Fig. 1.

Computation of reduced moment coefficients—Step 4

The general formula for determining the reduced moment coefficients for the loaded spans has been developed, but it is comparatively unwieldy, and although its use might be preferred by some, it is suggested that the comprehensive diagram from which the formula is derived (Fig. 3) be kept in mind, and the values of the coefficients be determined from its geometry. After a few trials it will be found unnecessary to draw a diagram for each loading condition. The computations may be made from the mental picture.

Referring to Fig. 3, let M_s denote the fixed-end moment at the left end of the fourth span, M_4 that at the right end, and M'_s and M'_4 the reduced moments at the left and right ends respectively when the moments are released. The coefficients of reduction may be denoted by m'_s and m_4 respectively.

From Step 3, $M_{u_3} = 5{,}760$ ft.-lb. and $M_{u_4} = 8{,}640$ ft.-lb. The line marked MCL is the moment-closing line for the fixed-end moments. Verticals are erected at the third points of the span, intersecting MCL at U_4 and V_4. If a value of unity be assigned to M_4, the relative value of M_s is $5760/8640 = 0.667$.

The ordinate of the point U_4 is 0.778, or one-third the difference in the ordinates M_4 and M_s, added to M_s. The ordinate of the point V_4 is 0.889, or one-third the difference in the ordinates M_4 and M_s, subtracted from M_4.

Draw the lines R_3U_4 and R_4V_4. Assign a value of unity to one-third the span length, and lay off the values of p_4 and p'_4 on the base line. Erect verticals through these points, intersecting the

lines R_3U_4 and R_4V_4 at P_4 and Q_4. Since $p_4' = 1$, Q_4 will coincide with V_4. From the similar triangles $R_3J_4U_4$ and $R_3P_4'P_4$ the ordinate of the point P_4 is found to be 0.769×0.598. Through P_4 and Q_4 draw a line intersecting the verticals through R_3 and R_4 at Y_3 and Y_4 respectively. The ordinate of Y_3 is m'_3, and that of Y_4 is m_4.

The slope of *mcl*, the reduced-moment closing line, is found by dividing the difference of the ordinates of Q_4 and P_4 by the horizontal distance between them. The value of m_3' is the ordinate of P_4 diminished by p_4 times the slope, and the value of m_4 is the ordinate of Q_4 increased by p_4' times the slope.

$$\text{The slope is } \frac{0.889 - 0.598}{1.231} = 0.236,$$

whence $m'_3 = 0.598 - 0.769 \times 0.236 = 0.417$, and
$m_4 = 0.889 + 1.000 \times 0.236 = 1125$

For the symmetrical loading on the fourth span the fixed-end moments are equal, and the *MCL* line is parallel to the base line and at unit distance above it. The lines R_3U_4 and R_4V_4 are inclined at 45 deg., so that the verticals through the points P_4' and Q_4' determine points P_4 and Q_4 which have ordinates equal to p_4 and p_4'. The slope of *mcl* is therefore $p_4' - p_4$ divided by the horizontal distance between P_4 and Q_4.

$$\text{The slope is } \frac{1.000 - 0.769}{1.231} = 0.188$$

Then $m'_3 = 0.769 - 0.769 \times 0.188 = 0.624$
And $m_4 = 1.000 + 1.000 \times 0.188 = 1.188$
Similarly, for the symmetrical loading of the other spans,

$$\text{Slope, third span} = \frac{0.500 - 0.495}{2.005} = 0.002$$

Then $m'_2 = 0.495 - 0.495 \times 0.002 = 0.494$
And $m_3 = 0.500 + 0.500 \times 0.002 = 0.501$

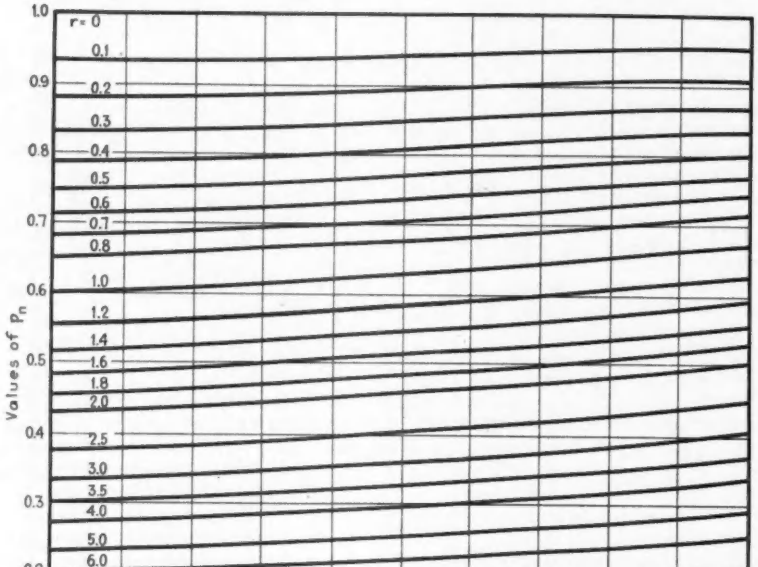
$$\text{Slope, second span} = \frac{0.750 - 0.692}{1.558} = 0.037$$

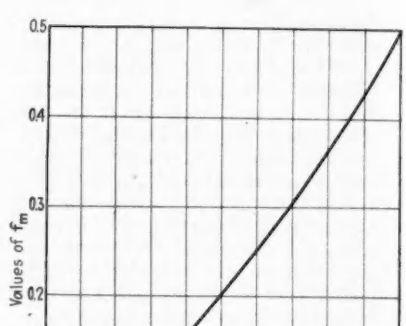
Then $m'_1 = 0.692 - 0.692 \times 0.037 = 0.666$
And $m_2 = 0.750 + 0.750 \times 0.037 = 0.778$

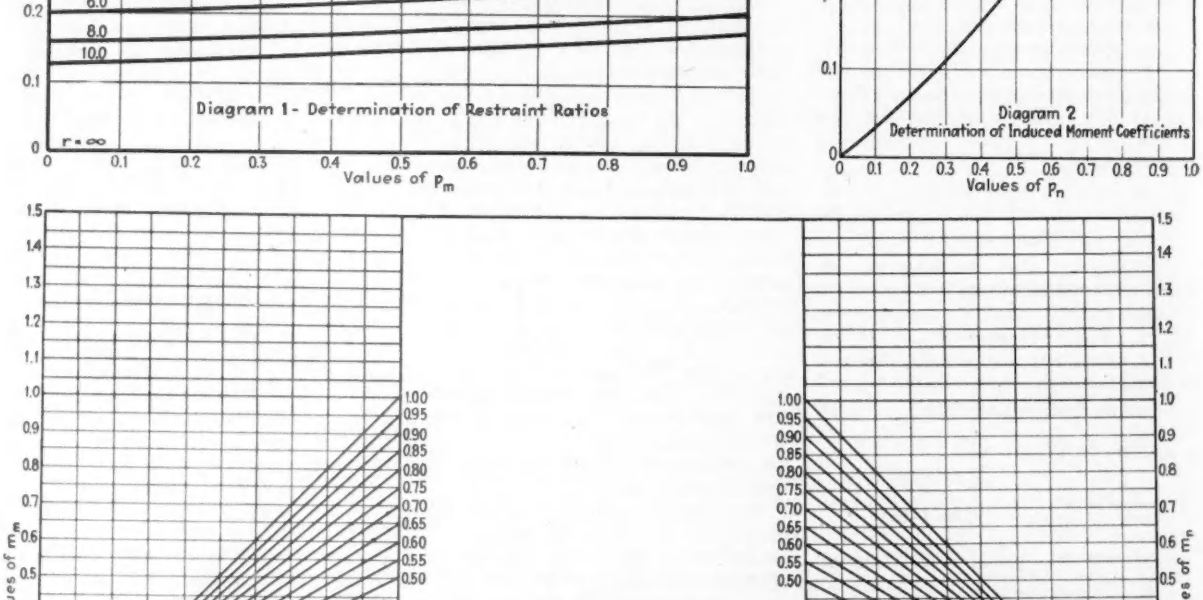
$$\text{Slope, first span} = \frac{0.545 - 0.000}{2.455} = 0.222$$

Then $m_1 = 0.545 + 0.545 \times 0.222 = 0.666$

FIG. 4—THREE CHARTS for graphical solution of continuous beams by the method of direct moment distribution.







Finally, as Step 5, the released moments are computed. The fixed-end moments for each span are multiplied by the corresponding m values. The reduced moments for each span are distributed to the other spans. It should be noted in this connection that the negative sign of the f value causes the induced moments to alternate in sign. The detailed computations follow:

(a) *FIRST SPAN LOADED*

$M'_0 = 0$
$M'_1 = m_1 M_1 = -0.666 \times 57600 = -38400$
$M'_2 = f'_2 M'_1 = +0.333 \times 38400 = +12800$
$M'_3 = f'_3 M'_2 = -0.200 \times 12800 = -2560$
$M'_4 = f'_4 M'_3 = +0.500 \times 2560 = +1280$

(b) *SECOND SPAN LOADED*

$M'_1 = m'_1 M_2 = -0.666 \times 32400 = -21600$
$M'_2 = m_2 M_2 = -0.778 \times 32400 = -25200$
$M'_0 = 0$
$M'_3 = f'_3 M'_2 = +0.200 \times 25200 = +5040$
$M'_4 = f'_4 M'_3 = -0.500 \times 5040 = -2520$

(c) *THIRD SPAN LOADED*

$M'_2 = m'_2 M_3 = -0.494 \times 22500 = -11100$
$M'_3 = m_3 M_3 = -0.501 \times 22500 = -11300$
$M'_1 = f_1 M'_2 = +0.300 \times 11100 = +3330$
$M'_0 = 0$
$M'_4 = f'_4 M'_3 = +0.500 \times 11300 = +5650$

(d) *FOURTH SPAN LOADED (SYMMETRICAL)*

$M'_3 = m'_3 M_4 = -0.624 \times 10000 = -6240$
$M'_4 = m_4 M_4 = -1.188 \times 10000 = -11880$
$M'_2 = f_2 M'_3 = +0.198 \times 6240 = +1240$
$M'_1 = f_1 M'_2 = -0.300 \times 1240 = -370$
$M'_0 = 0$

(e) *FOURTH SPAN LOADED (UNSYMMETRICAL)*

$M'_3 = m'_3 M_4 = -0.417 \times 8640 = -3600$
$M'_4 = m_4 M_4 = -1.125 \times 8640 = -9720$
$M'_2 = f_2 M'_3 = +0.198 \times 3600 = +710$
$M'_1 = f_1 M'_2 = -0.300 \times 710 = -220$
$M'_0 = 0$

These results are added algebraically, and the various steps are tabulated in Fig. 1. In finding maximum moments, the moments due to live load which reduce the total are omitted. This may be accomplished by deducting from any reduced or induced moment the moment multiplied by the ratio of the live load to the total load on the loaded span.

Graphical solution

In the average case the degree of accuracy obtainable by the use of the c, p, f and m equations is neither essential nor justified. In view of this fact, a semi-graphical method of solution is presented, in which the values of p, f and m may be determined to a degree of accuracy consistent with the variation in the physical constants of the materials involved.

In the use of the diagrams of Fig. 4, steps 1 and 3 of the analytical method are retained. Use p_1 as the abscissa, and interpolate between the r curves (diagram 1) until the value of r_2 is obtained; the corresponding ordinate is then p_2. This is used as a new abscissa, and the process continued until all p values are determined. Then start with p'_4, and work back until all p' values are determined.

From diagram 2, the f values corresponding to the p values are now obtainable. Assign a value of unity to the larger fixed-end moment for any span, and find the relative value of the smaller. Place a straight-edge between these two points laid off as ordinates on the corresponding ends of the span (diagram 3), and note the intersections with the verticals through the third-points of the span. Draw lines from these intersections to the corresponding zero points. Through the points determined by the intersection of these lines and verticals through p and p' values, lay a straight-edge, and on the verticals through the ends of the span will be found the m and m' values. It should be remembered that both m and m' are coefficients to be used with the larger fixed-end moment.

Conclusion

The writers, in presenting this new conception of end restraint and the subsequent development of the method of direct distribution of the fixed-end moments by the use of the most elementary equations, hope that they have made a real and substantial contribution to engineering practice. The exact solution made possible is simple and rapid, easily checked, and not difficult to commit to memory.

It has the widest possible scope in making separate analyses of live and dead-load moments, lends itself readily to the solution of any type of frame, and in short becomes a tool which, in its labor-saving element, has a value far greater than that of the time consumed in the mastery of its simple steps. The continuous formula arrangement for c, p and f, together with the simple diagram for m, is all that need be committed to memory to make possible the solution of any problem in continuity, regardless of the degree of its complexity.

Old Swing Span Moved Upstream for Road Detour

Tide utilized to float and reseat 600-ton span over Fore River at Quincy, Mass.—Old steelwork reinforced and braced for moving—Temporary pile center pier designed to requirements of permanent stucture

ONE of the most expensive detours ever called for in highway improvement was completed this year for the construction across Fore River of the handsome Quincy-Weymouth bridge by the Massachusetts department of public works. The temporary construction included the removal of the old swing span upstream to a position in a new trestle crossing flanked by well-paved connecting roads from its ends to the old road. Including the new trestle and connecting roads, the shifting of the old swing span and, finally, the dismantling of nearly all temporary structures, when the new bridge is in service, will bring the final cost of the detour to about $100,000.

Construction problems in connection with the detour operations centered principally in the temporary center pier and abutments for the moved swing span and in the procedure followed in moving this span into its new position. This article describes these detour construction operations with a sufficient account of the new bridge, now in the early stages of construction, to indicate its place in the general plan of improvement as indicated by Fig. 1.

Plan of improvement

The road crossing of Fore River between Quincy and Weymouth, Mass., is on the main highway from Boston to Cape Cod points. With a width of only 30 ft. and carrying street-cars, the old bridge formed a traffic bottleneck that has long been an obstruction awaiting available funds for removal. The project was approved under the Recovery Act and was laid out for about 7,500 ft. of new road, which includes 2,414 ft. of bridge and retained-fill approaches.

From the traffic viewpoint the important structural element of the new bridge is the width providing for a 60-ft. roadway and two 8-ft. sidewalks. The alignment is virtually straight; precisely, the center three of the spans are on tangent, the end to the north on a 7,000-ft.-radius curve, and the end to the south on a 2,600-ft.-radius curve. The approach roads at each end lead straight to the bridge. The alignment is substantially that of the old bridge, but the clear width for traffic is nearly 2½ times greater.

The location of the new bridge on the site of the old bridge required an across-river detour for the heavy main-road traffic. This temporary crossing also had to provide for busy navigation on the river, which meant the provision of an opening span. Since the swing span of the old bridge was at hand, the logical conclusion was to make use of it in the detour crossing.

This involved the necessity of moving the span upstream about 380 ft. to a temporary center pier and abutments in the detour structure. It was

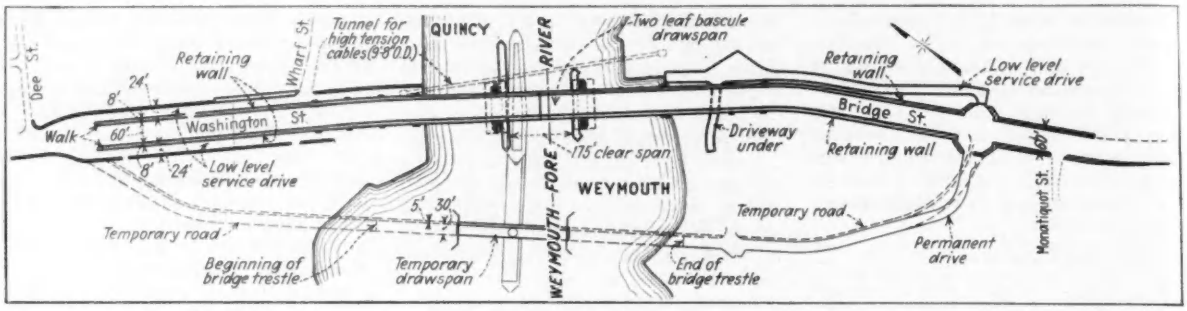


FIG. 1—PLAN OF DETOUR for the construction of the new road bridge over Fore River, Quincy, Mass.

decided to move the span bodily. The work was divided into: (1) design and construction of the trestle and the swing-span substructure; and (2) the operations of dismounting, moving and remounting the swing span.

Trestle and substructure design

The trestle crossing, including the substructure for the swing span, is 861 ft. 10 in. long. Excluding the end and center piers for the swing span, the structure is pile trestle of conventional type but unusually well braced transversely to resist the strong tidal currents. Six-pile bents were used (Fig. 2) with batter-pile braces at each end, and for the higher bents stiff lateral bracing in the plane of the piles was used.

Longitudinal bracing appeared only in five panels, as shown by Fig. 3, but an unusually rigid deck gave longitudinal rigidity. The ground also had good pile-holding qualities below the estuary silt, where there was firm sand, gravel or clay. The majority of the piles were 50 ft. long or more.

The exceptional design problems in the trestle crossing were the center pier for the swing span and in a small measure the bearing piers or abutments. Figs. 4 and 5 show the designs adopted, which called for pile structures capped with reinforced-concrete slabs. In designing the center or pivot pier it was assumed that there was a possibility that the temporary structure might be in use several years, and working stresses comparable to those used in permanent structures were therefore employed. The dead loads used were the old swing span, weighing 600 tons, and the weight of the concrete cap.

Referring to Fig. 4, the pile group under the cap consists of 69 plumb piles and 32 batter piles. Of the 32 batter piles sixteen were set to be 100 per cent useful for resisting rotary motion; eight were set so that their resistance would be divided about half and half against rotary and lateral motion, and the remaining eight were set to resist lateral motion only. All batter piles were located so that the concrete cap rests on them as well as on the plumb piles. To reduce punching shear as much as possible, all the plumb piles were cut with shoulders at the base of the cap. Due to the depth of water of 26 ft. at low tide and to the stability of location required of a pivot pier, it was considered desirable to brace the pier against swaying and rotation by some means in addition to the timber bracing above low water. This was done by placing eight steel cables with turnbuckles. These formed tension braces from riverbed level to the pile tops just under the cap.

In designing the concrete cap it was assumed that the plumb piles offered a uniform resistance and that the entire superimposed load, except of course the concrete cap itself, was uniformly distributed on the draw track. Thus a negative moment was produced at the center of the cap and a positive moment under the track. A pattern of reinforcement, changing direction at 45-deg. intervals, was used rather than circumferential and radial rods. The design stress for reinforcement was 18,000 lb. per sq.in. Punching shear, diagonal tension and bond were investigated. Compression stress in the concrete is small, and no allowance is made for compression in steel.

FIG. 2—TYPICAL BENT for detour trestle over Fore River, Quncy, Mass.

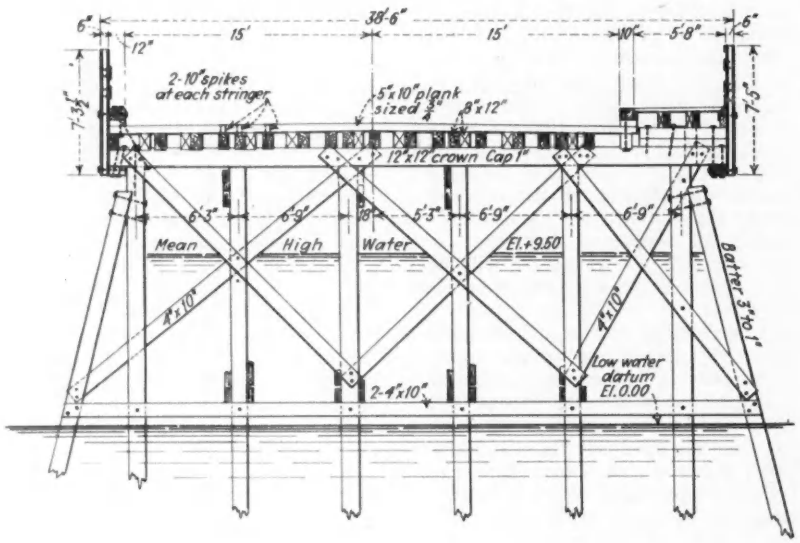
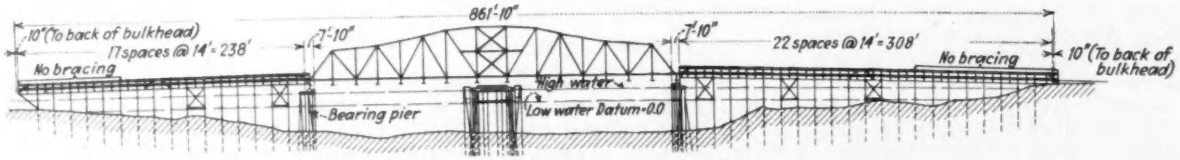


FIG. 3—DETOUR TRESTLE over Fore River, showing old swing span, moved from old bridge, installed on temporary pile piers.



Load computations

The computations showed the following loads: When the draw is open

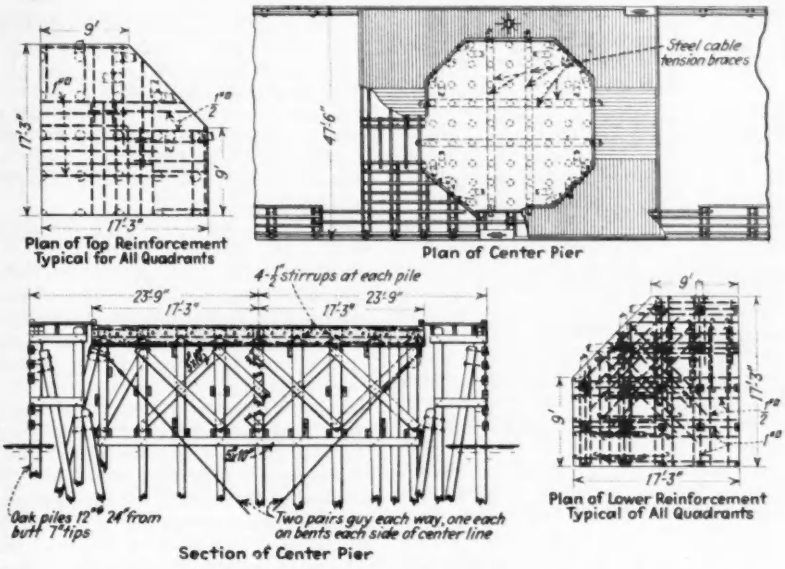

Steel cable tension braces
Plan of Top Reinforcement Typical for All Quadrants
Plan of Center Pier
4-1" stirrups at each pile
Oak piles 12" ø 24' from butt 7" tips
Two pairs guy each way, one each on bents each side of center line
Section of Center Pier
Plan of Lower Reinforcement Typical of All Quadrants

FIG. 4—PILE CENTER PIER with concrete cap for swing span in temporary trestle over Fore River.

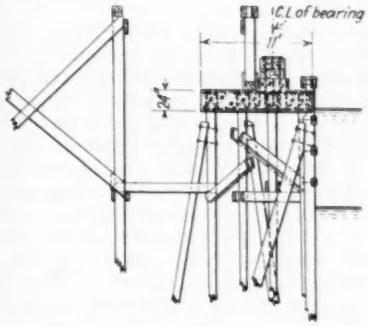


FIG. 5—BEARING PIER of piles with concrete cap for swing span in Fore River trestle crossing.

the actual dead weight upon the plumb piles, allowing nothing for the batter piles, is about 10 tons per pile. This was the figure used in the cap design. Nothing was allowed for live load or impact, as the ends of the span are supported when there is appreciable live load on the span.

Computations which were made for the twist of the entire pier due to the rotation of the drawspan showed that, with the maximum speed of 9.7 ft. per minute at the track, the maximum tractive force at the track was 312 lb. per foot of track. This produces a thrust on the outermost piles of 935 lb. per pile.

At the present time the temporary swing span has been in operation about ten months, and there has been no settlement or lateral movement affecting its operation.

Moving the swing span

In moving the swing span it was decided to utilize the rise and fall of the tide to lift the span from its old seat and to lower it into place on the new pier. Considered as a load to be moved bodily, the span was an articulated structure consisting of two truss spans hung by one end from a center tower, which was the sole point of ground support.

In order to change the support to two scows, one on each side of the tower, required the bracing of truss members to take the changed stresses. There was also a problem of balancing the structure on the scows and distributing the load evenly over scows that had not been designed for heavy concentrated loads.

Stresses were computed for the span as supported normally, and again for the span as supported substantially at third points by the two scows, to determine from the comparison the parts requiring reinforcement for the changed stresses. The main strengthening required is indicated by Fig. 6. Vertical *B* was stiffened by increasing the section by welded channels and plates. Timbers and tension rods were added as shown by the dash lines, hangers were installed to carry the center girders over the turntable, and a number of the connections were strengthened. The bracing to the scows is indicated sufficiently by Fig. 6. Brackets and angles were welded to the truss members, to give bearing for the inclined timbers which braced the trusses on the scows.

Floating the span and lowering it to its position were problems of selecting suitable tide periods and of fast and systematic working methods. Both movements were accomplished without mishap but under the somewhat uncomfortable conditions of a very cold winter day.

Direction

The work at Quincy, Fore River, including the detour and the new bridge, is being carried out by the Massachusetts department of public works, of which A. W. Dean is chief engineer. The contractor for moving the old swing span and constructing the trestle and approach roads is the Blakeslee-Rollins Corp., Boston, Mass., W. G. Cheever, general manager.

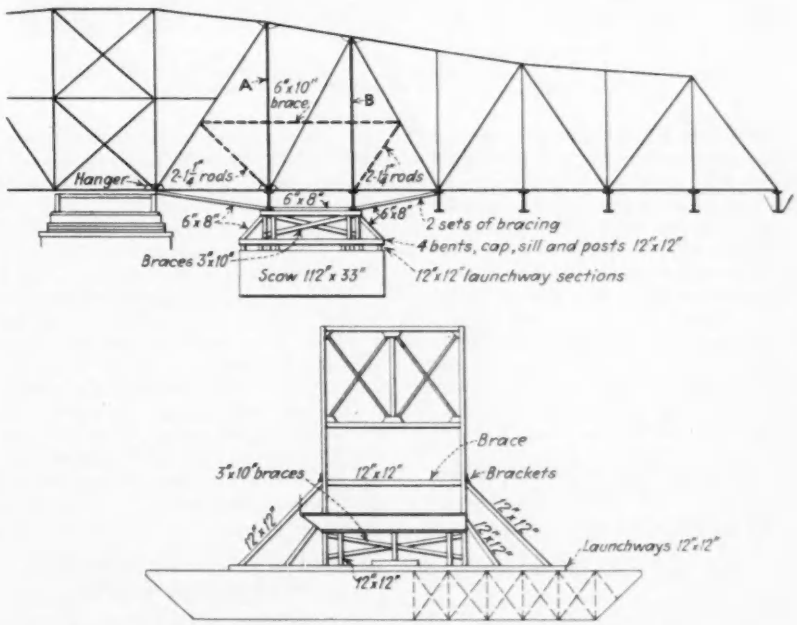


FIG. 6—BRACING OF SWING SPAN for support on scows that floated it to position in temporary trestle.

Road Research Capitalized by Wisconsin County

Cost reduced and quality progressively improved by well-directed experimentation throughout three-year program of concrete paving in Sheboygan County, Wis.

By William E. Barker
Evanston, Ill.

SHEBOYGAN COUNTY, WIS., voted $2,553,000 in bonds to build 120 miles of concrete pavement, and when the job was completed it had $743,000 of unsold bonds. This unique accomplishment was largely made possible by field research that resulted in substantial savings in the cost of materials and a 55 per cent increase in hourly production. At the same time the compressive strength of the concrete was increased 67 per cent. Some of the methods developed have been adopted by the Wisconsin highway commission, and the savings have extended to the entire state. The field research centered on the proportioning of aggregates to reduce voids (and so cut down the cement required) and on the development of efficient methods of pavement construction. One phase of this research, compaction by rolling, was described in *ENR*, April 6, 1933, p. 434.

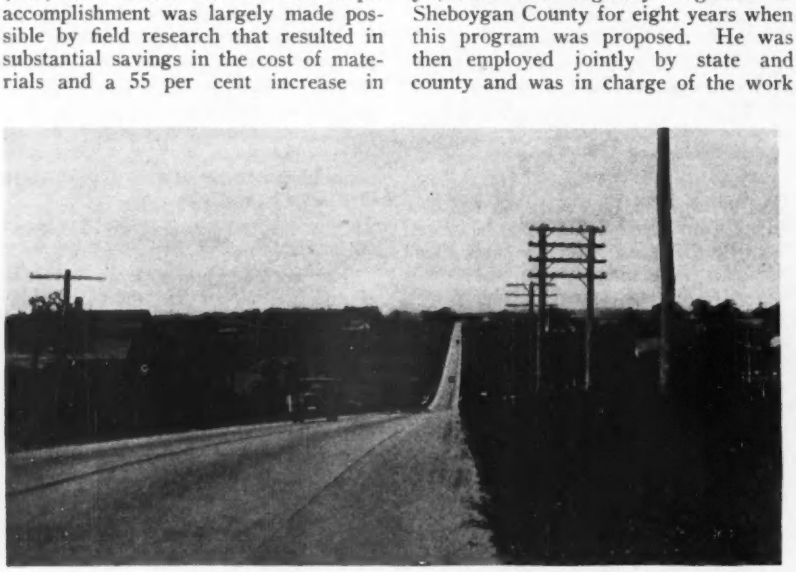


FIG. 1—STATE TRUNK HIGHWAY 57, built in 1929 in Sheboygan County and photographed in 1934, when it had gone through five rigorous Wisconsin winters. It is in fine condition, with no deleterious effects of a reduced cement factor.

Progress surpassed estimates—Costs were less

In April, 1928, Sheboygan County passed a bond issue with which to supplement state gas-tax funds available during the years 1927 to 1936 for constructing highways in the county. The 120 miles of road to be built were on the state trunk-highway system, and the bonds issued by the county would eventually all be retired with funds from the state gas tax, so the work was done under the direction of the state highway commission. Geo. Langley, Jr., had been highway engineer of Sheboygan County for eight years when this program was proposed. He was then employed jointly by state and county and was in charge of the work until its completion and initiated and carried out the field research.

The estimated cost of slightly more than $30,000 per mile was based on average costs in the state during 1925, 1926 and 1927, and was, at the time, considered very conservative.

It was estimated that the construction would take nine years—1928 to 1936 inclusive. The entire mileage, however, was completed by the end of 1932. The cost was $2,799,350, a saving of $847,635.16 over the estimated costs. Of the original bond issue there was an unsold balance of $743,000, and $102,649 of state gas tax allotted to the program was not expended, as indicated by Table I.

Trial of designed mix resulted in its general adoption

During 1928, 19 miles of road were contracted, of which twelve miles were finished during that season. The Wisconsin highway commission specifications called for a 1:2:4 mix, all measurements being by volume. But, for the work in Sheboygan County, permission was granted to measure the fine aggregate by weight, thus correcting for bulking in the sand. The average cement content for the season's work was 5.6 bags per cu.yd.

Cores that were cut from the pavement and broken at an age of six months showed a compressive strength of 3,820 lb. per sq.in. No machine was available with which to determine flexural strengths. The average cost per square yard of pavement on the project was $1.655.

For 1929 a project 10 miles in length was selected on which to test the theory that a designed mix would result in better concrete and reduced costs. Special provisions were written for this contract, providing for a mix designed to produce a modulus of rupture of 500 lb. per sq.in. at an age of 28 days, with a maximum of 6 gal. of water per sack of cement.

With the cooperation of the materials producer, aggregates, especially coarse aggregate (¼ to 2½ in.), were obtained with as low a void content as possible. Extreme care was taken in handling materials to avoid segregation, and frequent void-content tests were made. A field beam breaker was purchased, and several beams were fabricated each day, so that both 7- and 28-day flexural strengths could be recorded. This project was well under way before the rest of the year's projects were started. The early results were so satisfactory that it was decided to do all work for the season with the specifications adopted for the test project.

During the year (1929), 30 miles of road were constructed. The average cement content was 4.88 sacks per cu.yd. The average modulus of rupture was 640 lb. per sq.in. at 28 days, and the average compressive strength of cores cut from the pavement and broken in six months was 4,040 lb. per sq.in. The average cost for the season's work was $1.461 per sq.yd. The average in Wisconsin in 1929 was $1.67 per sq.yd. Comparing the cost in Sheboygan County with the costs of 1928, there was indicated a saving of $0.194 per sq.yd., of which 10c. was due to a reduction in the costs of material and $0.094 due to revised methods and increase in efficiency.

Most batch sizes exceeded rated capacity of mixer

For 1930, Mr. Langley asked permission to use coarse aggregate separated into three sizes (¼ to ¾ in., ¾ to 1½ in., and 1½ to 2½ in.) and a 33.4-cu.ft. batch, promising that the quality of the concrete would again be improved and the cost reduced. Permission was readily granted to separate and reproportion the coarse aggregate, but considerable difficulty was encountered in overcoming

TABLE I—FINAL FINANCIAL STATEMENT OF SHEBOYGAN COUNTY BOND-ISSUE HIGHWAY CONSTRUCTION PROGRAM

(120 Miles Concrete Highway Constructed 1928-1932—Estimated Cost $3,645,000)

Source of Funds	Funds Available	Funds Expended	Unexpended Balances
County bond issue	$2,553,000	$1,810,000	$743,000*
State gas tax, etc.	1,092,000	989,350	102,649
Totals.....	$3,645,000	$2,799,350	$845,649

*Bonds not sold.

prejudice against using a batch size larger than that recommended by the mixer manufacturers, which was 29.7 cu.ft.

Finally it was agreed that on each of two 11-mile projects, stone separated into three sizes and recombined in the batch should be used, and that one mile of each project should be constructed with each of the following batch sizes: 27, 30, 33 and 35 cu.ft. The modulus-of-rupture requirement was increased to 650 lb. per sq.in., and the maximum water per sack of cement was left at 6 gal. The cement content specified was 5 sacks per cu.yd. of concrete.

Cooperation of the division of management, U. S. Bureau of Public Roads, was obtained, and they placed a force of six engineers on each project with the necessary equipment, to determine the flexural and compressive strength of the concrete, the degree of uniformity within the batch and from batch to batch, together with the cost of production for each batch size. Six cylinders and three beams of sufficient length for three breaks each were fabricated from each test batch. In addition, a complete analysis was made of a sample taken from each corner and the center of each test batch. (*Public Roads,* January, 1932.)

The contractor on each project was equipped with a 27-E mixer manufactured in 1927. One mile of slab was laid on each project with each size of batch. The cooperation of the Koehring Co. and the Chain Belt Co. was obtained, with the result that, when the first 4 miles of tests had been run on each project, using the old mixers, new mixers of the latest type were placed on the projects, at the expense of the companies.

One mile of slab was then laid with each size batch on each project, using the new mixers. The rest of each project was then completed with the new mixers, using 30-cu.ft. and 33-cu.ft. batches, mixed 50 sec., 60 sec. and various longer periods, to ascertain the effect of length of time of mix on the oversize batches.

The results of these tests are best stated by quoting from the conclusion of the report on the season's work: "Under present actual job conditions and customary auxiliary equipment, the most economical batch for the 27-E paver is 33 cu.ft., with a mixing time of 50 sec. for all solid materials."

The average cost for the season's work was $1.418 per sq.yd. The average cost in Wisconsin that year was $1.58.

General quality averages for the 1930 work were: modulus of rupture at 28 days, 820 lb. per sq.in.; compressive strength by cylinders at 28 days, 3,800 lb. per sq.in.; and cores broken at an age of six months, 5,710 lb. per sq.in.

Largely as a result of these field-research findings, the specifications of the Wisconsin highway commission were revised, calling for the use of a designed mix instead of the old 1:2:4; coarse aggregate separated into three sizes, with a maximum size of 2½ in. for pavements, two sizes with a maximum of 1½ in. for structures, a maximum of 33 cu.ft. per batch instead of 29.7 cu.ft., and a mixing time of 50 instead of 60 sec.

Local pit aggregates cheaper and equal to commercial quality

After considerable consideration it was decided, again in cooperation with the division of management, U. S. Bureau of Public Roads, that field research should be carried on in 1931 on the question of cement content, and that studies should also be made of local-pit aggregate production. Twenty miles of road were built with aggregates from a local pit situated about ¼ mile off the project, 8 miles from one end and 12 miles from the other.

Beams, cylinders and cores were fabricated and broken, and the concrete was analyzed the same as during the previous year. Two miles were laid with each of the following cement contents per cu.yd. of concrete: 4.4, 4.6, 4.8 and 5.0 sacks, 1 mile of each cement content being with a coarse aggregate in three sizes (¼ to ¾ in., ¾ to 1½ in., and 1½ to 2½ in.) and 1 mile with a coarse aggregate in two sizes—¼ to 1 in. and 1 to 2½ in. Different aggregate combinations were also studied. Every effort was made to put as much absolute volume of coarse aggregate into the concrete as possible without making the concrete too harsh to finish properly. Near the end of the project 1,100 ft. of pavement were laid, the concrete of which was compacted with an ordinary road roller weighing 3½ tons. The finishing machine was used behind the roller, and the result, in reference to the riding quality and finish of the pavement, was fairly satisfactory. The concrete in this section had a cement content of 3½ sacks per cu.yd.; 0.93 cu.yd. of coarse aggregate, the absolute volume of which was 0.68 cu.yd., was used per cubic yard of concrete.

The reports on the season's work show that aggregates of good gradation and cleanliness may be produced in a local pit as cheaply as in the average commercial pit, and that a considerable saving in transportation cost is usually made.

These reports also show that many things other than the mere quantity of cement and water used per cubic yard of concrete must be considered if quality concrete at minimum cost is desired. In general, it is safe to say that, within reasonable limits, as the absolute volume of coarse aggregate in concrete of a specified cement content was increased, the concrete strength increased.

FIG. 2—A ROLLER was used on portions of the pavement, to eliminate voids in a concrete containing a high percentage of coarse aggregate.

The average strengths obtained during the season, with an average cement content of 4.7 sacks per cubic yard, were: modulus of rupture, 880 lb. per sq.in. at 28 days; cylinders, 4,300 lb. per sq.in. at 28 days; and cores, 5,820 lb. per sq.in. at six months.

The average cost per square yard of pavement was $1.086, and the average for the season in the state was $1.382.

Concrete compacted by roller proved good as average

Results obtained with the rolled-concrete section were such as to indicate

that a further trial of rolling was warranted; as a consequence, one project, 10 miles in length, was partly devoted to a study of this method in 1932. Specifications for the rolled-concrete section required that at least 1,200 lin.ft. of pavement be built with each of the cement factors: 3½, 4, 4½, 5, 5½ and 6 sacks per cu.yd. A six-ton roller was specified, and this was to be followed by a finishing machine. Each section of rolled concrete was to be followed by an equal amount of pavement with the same cement factor, finished by the ordinary methods. The rest of this project and another project, 14 miles in length, were devoted to a study of different methods of curing.

A total of 7,537 lin.-ft. of rolled concrete was laid in six days of twelve hours each. The maximum laid in one day was 1,560 ft., and the average for all rolled concrete was 104.7 lin.ft. of 20-ft. pavement per hour.

The rolled pavement appears nearly, if not quite, as good as average pavement finished in the usual manner. The riding quality is fair, the surface finish good; and, so far as can be ascertained, there is no unusual amount of honeycomb.

The average cement content for the season's work, other than the rolled concrete, was 4.6 sacks per cu.yd., and the average modulus of rupture at 28 days was 890 lb. per sq.in. No cylinders were fabricated. The core tests averaged 6,230 lb. per sq.in.

The average cost was $0.87 per sq.yd., and the average cost in the state was $1.183 per sq.yd.

Lower cost and higher strength the result of research

The transverse strengths as recorded are subject to correction. In 1929 and 1930 field beam breakers of the cantilever type were used. In 1931 an improved breaker, the so-called Iowa type, was obtained and used on all subsequent tests.

A large number of tests showed that the cantilever machine gave a modulus of rupture 150 lb. per sq.in. greater than the Iowa machine. As the tests of 1929 and 1930 had been recorded as obtained with the cantilever machine, 150 lb. was added to strengths that were secured with the Iowa machine in order that direct comparison in the strengths obtained each season could be made.

It matters little whether or not the transverse strengths shown are reduced 150 lb., as the important fact is the constant season-to-season increase in transverse strength. The ratio of increase would be the same if this correction were made, and all tests were recorded on a basis of the Iowa machine.

It is interesting to note that although all materials used during this bond-issue construction period were approximately equal in quality, there was an increase of flexural strength in the concrete of 1932 compared with 1929 of 39 per cent, and compared with 1928 of 63 per cent.

The total reduction in cost per sq.yd. from 1928 to 1932 was 47.5 per cent, and of this 26.6 per cent was due to research.

The saving of $280,165 directly traceable to research on these projects was 10 per cent of their total cost. No accurate estimate can be made of savings in the state due to revision of specifications caused in part, at least, by reports from the Sheboygan County field-research projects.

The saving in cost for each year, as compared with 1928, is shown in Table II. The year 1928 is used as a basis of comparisons because in this, the first season of the bond-issue program, work was done under standard state specifications. But prices of materials and labor were falling in the period after 1928, so the total savings made have been divided in the table, some being credited to reduced prices and the rest to revised methods.

A chart shows concrete strength, proportions, cement factor and hourly production for each year, beginning with 1928.

In spite of the great density, high strength, high percentage of coarse aggregate and comparatively low water-cement ratio, the question of durability of pavements with cement factors lower than customary was frequently raised during construction of Sheboygan County's bond-issue system. This could only be answered after the pavements had gone through several of Wisconsin's rigorous winters.

Comparison of durability indicates no deficiency

The last-built pavement of this series is now nearly two years old; the first has been in service six years. If the concrete lacks durability, there should be some indication of it. Inspection of the pavements discloses no indication of weathering or other deterioration.

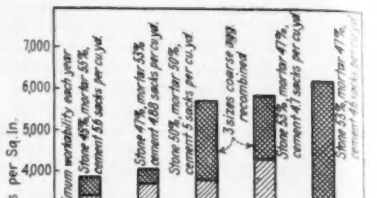

Pounds per Sq. In.
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
Water sufficient for maximum workability each year
Stone 45%, mortar 55%, cement 5.6 sacks per cu.yd.
82 Lin. feet per hour
Stone 47%, mortar 53%, cement 4.88 sacks per cu.yd.
83.2 Lin. feet per hour
Stone 50%, mortar 50%, cement 5 sacks per cu.yd.
3 sizes coarse agg. recombined
120 Lin. feet per hour
Stone 53%, mortar 47%, cement 4.1 sacks per cu.yd.
122.8 Lin. feet per hour
Stone 53%, mortar 47%, cement 4.1 sacks per cu.yd.
127 Lin. feet per hour
1928
1929
1930
1931
1932
KEY: 28 day cylinder 6 month cores Mod. of rupture

FIG. 3—STRENGTH OF CONCRETE obtained yearly over a period of five years on Sheboygan County pavements.

TABLE II—CONCRETE COSTS 1928 COMPARED WITH 1929-30-31-32

Year	Total, Sq. Yd.	Cost per Sq. Yd.	Saving Compared with 1928 Per Sq. Yd.	Saving Compared with 1928 Total	Due to Reduced Cost of Material and Labor Per Sq. Yd.	Due to Reduced Cost of Material and Labor Total	Due to Revised Methods Per Sq. Yd.	Due to Revised Methods Total
1928	228,000	$1.655						
1929	360,000	1.461	$.194	$69,840	$.10	$36,000	$.094	$33,840
1930	330,000	1.418	.237	78,210	.10	33,000	.137	45,210
1931	242,400	1.086	.569	137,925	.246	59,630	.323	78,295
1932	276,000	0.87	.785	216,660	.34	93,840	.445	122,820
Totals	1,436,000			$502,635		$222,470		$280,165

The two projects built in the season of 1929 had a cement factor of 4.8 bags per cu.yd. and have gone through five winters. One carries about 1,500 vehicles a day, a large percentage of which is heavy trucks, and one about 1,200 vehicles per day.

A continuation of each of these projects was built during the same season in adjacent counties in the state, using the same type of materials but a 1:2:4 mix, with a cement content in excess of 5.5 bags per cu.yd.

The first two comparable projects are in about the same condition, and that condition is better than the average of projects built in the locality that season. Of the two other comparable projects, that built with 4.8 sacks per cu.yd. is in far better condition than that built with the 1:2:4 mix, the latter being in about the average condition of projects built during the same season and under the same specification.

The work of following seasons can only be compared with projects built during the same season but not so closely adjoining. Inspection shows them in far better than average condition for their age. There has been a very small amount of cracking and no sign of weathering. Cores cut from these pavements in successive years have shown a constant increase in strength.

Inasmuch as these pavements, especially those built during the season of 1929, are old enough to show signs of disintegration if they lack durability, it seems that even that argument has been answered and that these economically constructed pavements will stand the test of time.

Construction League Outlines Objectives and a New Program

THE Construction League of the United States, representative of professional and trade associations of the construction industry, submitted an outline of its objectives and a tentative program of activities, for both emergency and normal construction periods, at its meeting at Knoxville Dec. 7. Several changes suggested there were made, and the revised program is now being circulated for discussion and criticism. The program will be submitted at the annual meeting in January for adoption.

The Construction League, organized to create an agency through which the construction industry might improve its services to the public, cooperate with other organizations, counsel with government and present its views to the public, has the following objectives:

1. To coordinate all groups in the construction industry.
2. To act as spokesman for the industry in relations with the public and with public officials.
3. To cooperate with other groups which, constantly or from time to time, may have interests in common with construction.
4. To carry on promotional and educational work of common benefit.
5. To conduct investigations aimed to develop measures for stabilizing the industry, eliminating waste and improving the services rendered the public.
6. To encourage legislation that will help improve the services of the industry to the public and oppose legislation detrimental thereto.
7. To take such measures and action as may be necessary or desirable from time to time to carry these objectives into effect.
8. To cooperate in improving relations between employers and employees.

Emergency program

Under present conditions, when federal, state and municipal governments are utilizing the industry as an instrument for recovery and are discussing still further use thereof, the industry is under special obligation to give of its counsel to government. In doing so it believes that the following principles must be observed if there is to be healthy general recovery.

a. That emergency measures should in themselves be sound and not violate basic economic principles.

b. That sound recovery can come only through a revival of private industry, private purchasing and private financing, including community purchasing of sound public improvements essential to community progress and encouraging to private investment.

c. That any emergency program of public construction must differentiate sharply between work-relief projects and sound long-range community investments, with the maximum possible emphasis on the latter so that work-relief projects will be tapered off as rapidly as sound projects can be substituted for them.

d. That federal financial aid to state, county and municipal public-works projects be reduced as soon as these communities can initiate and finance them according to normal practices without substantially reducing the volume of work needed for progressive re-employment.

e. That speed is of the essence of the recovery program, that any new emergency measures be designed to create the maximum number of jobs in the next year, and that where handicaps to speed exist in present emergency measures these handicaps be promptly removed.

Based on these principles, the league advocates the following measures and will take steps to encourage and secure their adoption:

1. That wages paid on projects financed in whole or part by federal funds be made those prevailing locally at the point of construction. Such conformity with local economic conditions will push forward many projects now held up, and will thus create additional employment.
2. That such federal and state legislation be enacted as may be necessary to make more effective the federal housing and other acts affecting the financing of new construction and the agencies required therefor. Such legislation will facilitate the flow of private capital into home financing and construction.
3. That rental financing laws for constructing waterworks, sewerage and disposal systems be enacted in states where such laws do not now exist. Such laws place these plants on a self-liquidating basis, facilitate their financing and the approval of such projects by the voters.
4. That, in order to encourage investment of private capital in construction, consideration be given to legislation permitting deduction from gross income of amounts invested during a given period in construction and durable goods and providing also, for a limited period, exemption of real estate improvements from taxation.
5. That additional federal appropriations for public works be made only in accordance with the principles previously outlined, namely, that they are emergency measures, that they be used only in lieu of better alternatives, that they be decreased to volume commensurate with progressive advancement of permanent recovery and held within limits of a balanced budget as soon as recovery in individual and community activities makes this possible.
6. That projects calculated to reduce hazards to highway traffic and projects planned to create recreational facilities, such as grade-crossing elimination and conversion of open spaces into parks and playgrounds, be included in any necessary program of public works, the credit to be provided or guaranteed by the government under a sound plan of financing.
7. That, in the interest of sound recovery, which as stated above involves the revival of private industry, the policy of government departments of assuming functions, under the guise of emergency, that are normally and properly those of industry, be discouraged.

Normal program

In addition to this emergency program, the league, in order to accomplish its general objectives of serving the industry and the public, will proceed with the following normal program:

1. Organize a continuing study aimed to bring construction and building costs in balance with costs of manufactured goods and agricultural products. This balancing is necessary if other groups are to purchase in volume the products of the construction industry. Previous studies of this kind have been occasional, and no agency was available to carry the conclusions into effect. The league, as a continuing body, takes the responsibility of trying to translate the conclusions of such a study into action.
2. Promote sound revision of building codes so that all materials and methods of construction be used to maximum efficiency and that political, labor and competitive handicaps to the writing of codes which are in the public interest be eliminated.
3. Encourage and cooperate in the development of a system of professional appraisals as attachments to issues of mortgage securities. Such appraisals were sorely lacking during our pre-depression building boom.
4. Develop permanent time-payment plan for building modernization to function when the present federal modernization effort is concluded.
5. Study and promote sound expenditures of highway revenues so as to discourage the diversion of motor revenues from highway construction to other purposes; secure the restoration to highway work of revenues now diverted.
6. Develop pay-as-you-go policies for municipal construction, thus eliminating interest charges and doubling the volume of funds available for public construction.
7. Encourage advance planning and approval of public works and buildings, thus furnishing a reservoir of productive jobs to be drawn upon in periods of recession. This advance planning is necessarily implied in the pay-as-you-go policy previously stated.
8. Develop a sound policy for housing those in the low-income groups, using government credit as may be needed but adhering to the policy of private-ownership responsibility and ultimate repayment of costs.
9. Cooperate with governmental agencies in developing fair contractual relations for performing architectural, engineering and constructing services and work and in eliminating the wasteful and inefficient practice of government's performance of these services.
10. Continue sponsorship of the construction codes and encourage and strengthen trade associations within the industry

both as a matter of long-time policy and to provide a transition for possible changes and modifications in the codes.

11. Continue and perfect the organization of state construction groups to carry out the league's program locally, enlisting the support of existing groups in the industry.

Sewage-Plant Survey—X

Data from Akron, Ohio

THE FOLLOWING ARTICLE is the tenth of a series presenting in brief form the salient design and performance characteristics of American sewage plants. Articles already published have presented data from the following cities: Decatur, Ill., Cleveland, Ohio, Schenectady, N. Y., Aurora, Ill., Lima, Ohio, Grand Rapids, Mich., Urbana, Ill., Baltimore, Md., and Toledo, Ohio.

AKRON, OHIO, has two sewage plants, both utilizing Imhoff tanks and trickling filters. Through the operation of these plants during 1933 the B.O.D. of the city's sewage was reduced by 89 per cent. Detailed design and performance characteristics of both plants are given in the accompanying tables.

The city had a population of 258,000 in 1930, of which about 200,000 are now served by a combined sewer system.

Plant No. 1, the larger of the two, include coarse screens, detritus tanks for grease and grit removal, grit channels, fine screens, Imhoff tanks, trickling filters, secondary settling tanks and sludge-drying beds. The plant was designed in 1925, with Metcalf & Eddy acting as consulting engineers, to treat an average sewage flow of 33 m.g.d., providing for a population of 260,000 expected in 1935. The plant was put into operation in 1928. In addition to the original construction, auxiliary sludge lagoons were provided in 1931, an auxiliary flushing water-supply system in 1932, and auxiliary sludge-drying beds in 1933. The total cost of the plant to date is $3,712,400.

Sewage flows are measured by two 48x28-in. venturi meters. Analytical results as given in the tables are determined from 24-hour composites of samples taken every 1½ hours.

Plant No. 2 was designed in 1914 by R. W. Pratt to treat a flow of 8 m.g.d., providing for a population of 80,000. The treatments units comprise coarse screens, grit chambers, Imhoff tanks, trickling filters and sludge-drying beds. The total cost of the plant to date has been approximately $500,000. Operation was begun in 1916.

Sewage flows of Plant No. 2 are determined by weir measurements. Analytical results are determined on the basis of composite samples.

The data given herewith have been provided by T. C. Schaetzle, chief engineer and chemist of both plants. Flow data and operating results represent the annual averages for 1933.

SEWAGE-PLANT PERFORMANCE DATA, AKRON, OHIO—PLANT NO. 1

GENERAL DATA

Rated capacity of plant, m.g.d.	33.0
Sewage flow	
Average m.g.d.	31.4
Maximum day, m.g.d.	92.7

SEWAGE-TREATMENT UNITS

Coarse Screens

Number of units	1
Width of opening, in.	2½
Submerged area of screen, vertical projection, sq. ft.	89
Angle of screen with horizontal, degrees	60
Method of cleaning	Manual

Detritus Tanks

Number of units	2
Diameter each unit, ft.	55
Total depth, ft.	15
Average flow, each unit, m.g.d.	15.7
Detention period at actual flow, each unit, min.	16
Method of cleaning	revolving scrapers

Grit Channels

Number of units	2
Plan dimensions, each unit, ft.	3x50
Operating depth, including grit space, ft.	6
Velocity at average flow, ft. per sec.	1.0
Method of cleaning	longitudinal scrapers
Frequency of cleaning	Continuous

Fine Screens

Number of units	2
Type	revolving drum
Speed of rotation, r.p.m.	15
Width of opening, in.	¼
Loss of head, average, ft.	0.5

Imhoff Tanks

Number of units	24
Plan dimensions, each unit, ft.	75x27½
Settling compartment	
Surface area, each unit, sq. ft.	2062.5
Depth to slot, ft.	15½
Sludge compart., each unit, cu. ft.	24,000
Gas-vent area, each unit, sq. ft.	335
Sewage flow, all units, m.g.d.	31.4
Detention period, all units (actual flow), hours	2.1
Frequency of sludge removal, each unit, times per year	24

Trickling Filters

Number of units	7
Total area, all units, acres	14
Sewage flow, all units, m.g.d.	31.4
Type of filter material	crushed limestone
Depth of filter material, ft.	10
Type of distributing system	spray nozzle
Type of underdrain system	metro flooring

Secondary Sedimentation Tank

Number of units	12
Plan dimensions, each unit, ft.	50x65
Operating depth, including sludge space, ft.	7½
Sewage, flow, all units, m.g.d.	31.4
Detention period at actual flow, both units, hr.	1.6

SLUDGE DISPOSAL

Sludge-Drying Beds

Number of units	68
Length each unit, ft.	160
Width each unit, ft.	15
Depth of sand, in.	9
Depth of sludge applied, in.	8
Thickness of dried cake, in.	3

ANALYTICAL RESULTS

	Suspended Solids p.p.m.	Total Solids p.p.m.	Five-day B.O.D., p.p.m.
Imhoff tank influent	189	1,669	155
Imhoff tank effluent	99	....	105
Trickling-filter effluent	73	....	24
Secondary-tank effluent	41	1,557	17

SCREENINGS GRIT AND SLUDGE

	Volume, Cu. Ft. Per M.G.	Dry Solids, Per Cent	Volatile Solids, Per Cent	pH	Disposal
Coarse screenings	0.5	....	....	...	Dumped, covered with dried sludge
Grit	8.0	37.9	33.8	...	Dumped, covered with dried sludge
Fine screenings	1.5	12.0	....	...	....
Imhoff-tank sludge	321	7.2	48.4	6.7	To drying beds and lagoons.
Secondary-tank sludge	106	6.3	....	...	Imhoff tanks
Dried sludge	4.4	52.7	....	...	Given away to farmers

SEWAGE-PLANT PERFORMANCE DATA, AKRON—PLANT NO. 2

GENERAL DATA

Rated capacity of plant, m.g.d.	8.0
Sewage flow	
Average, m.g.d.	1.5
Maximum day, m.g.d.	4.2

SEWAGE-TREATMENT UNITS

Coarse Screens

Number of units	2
Width of opening, in.	1½
Submerged area of screen, vertical projection, sq. ft.	28.5
Angle of screen with horizontal, deg.	30
Method of cleaning	manual

Grit Chambers

Number of units	4
Plan dimensions, each unit, ft.	5x50
Operating depth, including grit space, ft.	6
Depth alloted to grit space, ft.	2–2.5
Average flow to each unit, m.g.d.	0.4
Detention period of actual flow, each unit, min.	9
Method of cleaning	water ejector
Frequency of cleaning	3 or 4 times per year

Imhoff Tanks

Number of units	12 (3 used)
Plan of dimensions, each unit, ft.	22½x77½
Settling compartment, each unit	
Surface area, each unit, sq. ft.	1,439
Depth to slot, ft.	14.5
Area of cross-section, sq. ft.	484
Sludge compartment, each unit, cu. ft.	10,000
Gas-vent area, each unit, sq. ft.	96
Sewage flow, all units, m.g.d.	1.5
Detention period, all units (actual flow), hours	6.1
Frequency of sludge removal, each unit	monthly

Trickling Filters

Number of units	4
Plan dimensions, each unit, ft.	200x200
Sewage flow, all units, m.g.d.	1.5
Type of filter material	slag
Depth of filter material, ft.	6
Type of distributing system	spray nozzle
Type of underdrain system	tile

SLUDGE DISPOSAL

Sludge-Drying Beds

Number of units	7
Length, each unit, ft.	165
Width, each unit, ft.	21
Depth of sand, in.	24
Depth of sludge applied, in.	12

ANALYTICAL RESULTS

	Suspended Solids p.p.m.	Total Solids p.p.m.	Five-day B.O.D. p.p.m.
Imhoff tank influent	180	1,771	217
Imhoff-tank effluent	80	...	133
Trickling-filter effluent	48	...	24

SCREENINGS, GRIT AND SLUDGE

	Volume, Cu.Ft. Per M.G.	Disposal
Coarse screenings	0.5	Buried.
Grit	13.0	Buried.
Imhoff-tank sludge	273.5	To drying beds
Dried sludge	8.4	Fill.

Traveler on New Low Roof Removes Old Arch Trusses

Riding on trusses of new trainshed roof of La Salle St. Station, Chicago, steel traveler carries falsework to support arched roof trusses being removed by traveler derricks

FIG. 1—TRAVELER which removed old arch roof of La Salle St. station in Chicago was mounted on trusses of new flat roof.

FOR THE REMOVAL of the old arch-truss trainshed roof of 212-ft. span at the LaSalle St. station, Chicago, after the construction of the new flat roof beneath it (*ENR*, Sept. 20, 1934, p. 363), the plan adopted was to work from a large steel-frame traveler mounted on the new roof and starting at the outer end of the trainshed. Work in progress on one of the last trusses is shown in Fig. 1, while the design and operation of the traveler are shown in Figs. 2 and 3.

The first operation was to tie together the two arches at the outer end by means of temporary X-bracing, and to place inclined braces from the new roof to the bottom chord of the second arch, in order to prevent any tendency toward overturning while the roofing of the first bay and the steel and glass of the end screen were being removed.

During the erection of the traveler the removal of this screen, as well as some of the purlins and bracing in the first bay of the arched roof, was handled by a locomotive crane having a 100-ft. boom. The material removed was lowered into a gondola car coupled in front of the crane. This crane and car occupied one of the station tracks and could work only between 10 a.m. and 4 p.m., on account of the heavy suburban traffic.

The traveler was erected in two sections, the first and forward section carrying falsework on which blocking was placed to support each post of the end truss. When thus supported, the members of the truss were cut or disconnected and lowered by the locomotive crane. This first stage of the traveler is shown in Fig. 3A.

The traveler then moved forward 30 ft., or one bay, and the second truss was dismantled and removed in the same way. Then the rear section of the traveler was built, carrying the derricks and electric hoists for the remainder of the work. With the traveler thus completed and ready for service, the work from the track deck was stopped, all operations for the remaining seventeen trusses being carried on from the new flat roof of the trainshed and the deck of the traveler. This typical arrangement, as used for all but the extreme ends of the trainshed, is shown in Fig. 3B.

With the traveler completed, its deck framing consisted of four lines of transverse trusses, as shown in Fig. 2, well braced together and carrying a working deck 63 feet long, composed of 2-in. plank on 4x12-in. stringers spaced 3 ft. c. to c. This deck extended down over the inclined top chords of the end panels of the traveler. A similar but fixed deck was built over the inclined top chords of the transverse trusses of the new roof. The decking thus afforded full protection to the station against falling material.

To carry the traveler, three lines of longitudinal runway beams were laid on top of the trusses of the new roof (Fig. 2). Two of these lines were composed of pairs of 15-in. I-beams in lengths of 30 ft. 3 in., placed directly over the end posts of the transverse trusses of this roof, at the side walls. The third line consisted of a pair of 33-in. I-beams in lengths of 60 ft. 6 in. placed over the top chords of the central longitudinal trusses of the new trainshed roof. These 33-in. beams were 60 ft. 6 in. long, as that is the spacing of the columns supporting the longitudinal line of trusses. The traveler framing was supported on each line of beams by twelve trucks, each having four flat-faced 18-in. wheels, or 48 wheels in all. It was hauled forward as required by cables anchored ahead and operated by the hoist-engine drums. As the two transverse spans covering the width of the trainshed are not symmetrical, the width of the traveler was divided into two spans of 72 ft. and 96 ft.

On the forward section of the traveler was the falsework, which was blocked up under each roof truss in turn, as already described. On the second or rear section were installed two steel stiff-leg derricks with 75-ft. booms. These derricks were specified to weigh not more than 20 tons each and to have the hoisting machinery mounted between the stiff legs, so that about 90 per cent of its weight would be concentrated on that truss of the traveler to which the stiff-legs were anchored. The maximum load lifted was not to exceed 5,000 lb.

One arch truss, with all the smaller material of the bay beyond it, was removed at each set-up of the traveler, all roof framing and bracing connected to the truss being removed before the dismantling of the truss itself. As the members of the trusses and roof framing were removed, they were either lowered directly into motor trucks in the two streets flanking the trainshed, or deposited on the traveler deck until a truck was ready for loading. This operation caused no interference with traffic, but during the short time that a truck was standing, a flagman directed vehicles to pass around it. For the slabs and roof covering, however, it was found practicable and convenient to lower this material through the smoke ducts of the new roof into cars placed to receive it. This was done at such times as a track could be assigned.

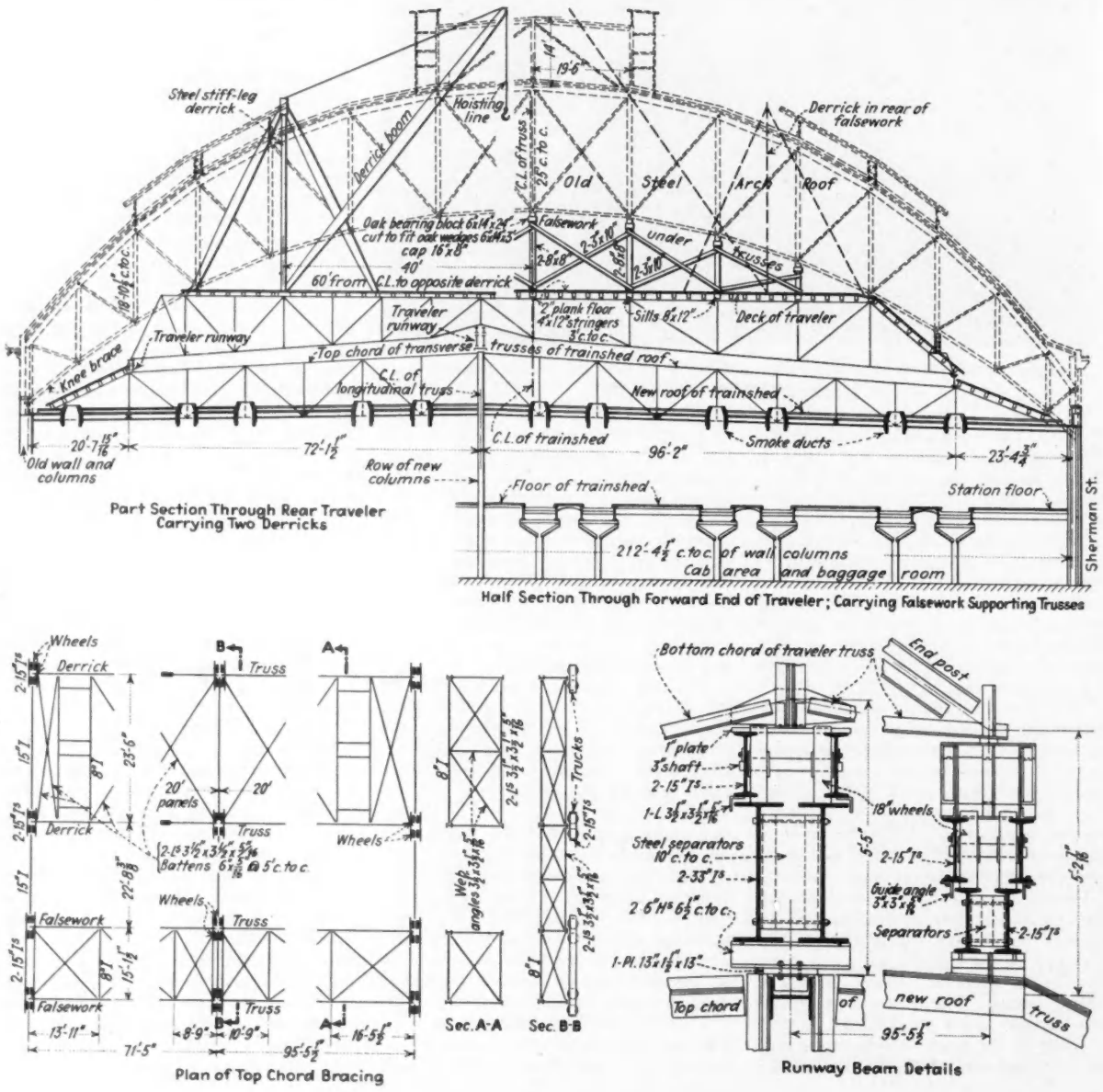
To prevent any possibility of longitudinal overturning movement of the arch truss in process of removal, which movement might lead to collapse of the old roof, the truss next to the one being dismantled was guyed by wire cables anchored to the transverse trusses of the new roof below. In removing the last truss, also, the screen at the headhouse end of the trainshed was guyed in a similar way.

When the last arch truss had been removed, the forward section of the traveler, carrying the falsework, was dismantled, so that the rear section carrying the derricks could be advanced within reach of the end screen. This position is shown at C in Fig. 3. Besides the framing of this screen, the derricks then removed a tall steel 6-ft. ventilating shaft which, with a fan, had served the cabstand space under the trainshed. The shaft had a horizontal discharge elbow above the crown of the old roof.

Much of the old roof framing was in bad condition, little maintenance work having been done on it in recent years, owing to the difficulty of access and the consequent cost and time involved. The old purlins were reinforced some years ago by timbers laid against them. Practically all the connection pins of the trusses were rusted solidly in place. No attempt was made to knock them out, the truss members being severed near the ends of gas torches. As a precaution, every section or piece removed was secured to the derrick-hoisting cable before the final torch cut was made on that piece. It was required that all torch cuts should be made clear through the section to be removed before that section was lifted, so as not to exceed the specified permissible load. All the steelwork was sent to the contractor's shop, to be cut into 5-ft. lengths as furnace scrap, the pins going in with the structural steel as they could not be removed.

Following removal of the roof trusses, their supporting columns in the side walls of the trainshed were cut off by torches just above the surface of the new roof, and a parapet wall of concrete, brick and stone was built along each side of this roof as a finish to the lower part of the old side walls, which

FIG. 2—STEEL TRAVELER details, showing (in elevation) the falsework blocked up under arch trusses and the two derricks that handled members as they were cut loose; (in plan) the top-chord bracing of the traveler and the positions of its 48 wheels; and (at lower right) the runway beams that carried the traveler along the new roof.



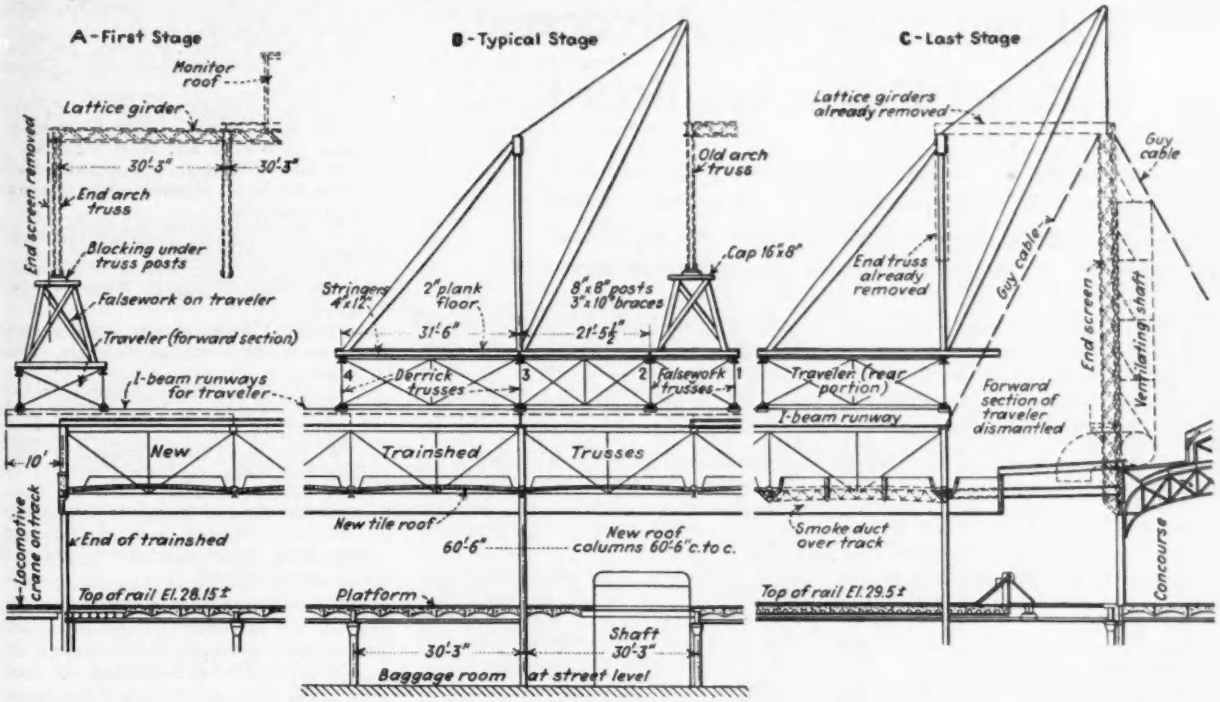


FIG. 3—WORKING POSITIONS of traveler: (A) at left, first truss blocked up, material removed by locomotive crane on track; (B) typical position with traveler completed and carrying derricks; (C) at right, falsework and part of traveler removed to allow derricks to reach end screen of trainshed.

remain in place. All this work was done from the top of the new roof. Removal of the screen at the outer end of the station and of the first truss was begun on July 15; the completed traveler began its work at truss No. 3 on Aug. 20. By Sept. 17 the nineteen trusses had been removed, and the work was under contract for completion by Oct. 15. For this removal of the steel framing, work was carried on night and day in three shifts, with about 100 men per 24-hour day and an average advance of one complete bay per day.

Methods and plans for this roof-removal job were studied and worked out by the engineering force of the Chicago, Rock Island & Pacific Ry., bids on the definite plans and specifications being then received from contractors. This method was considered safer and more satisfactory than to have bidders propose their own plans of procedure, since the engineers were more familiar with the conditions to be met. The study of design and working conditions of the traveler included mathematical analyses of: (1) the load concentration under the derrick mast with the maximum load at tip of boom during both vertical (or luffing) and horizontal swing of the boom; and (2) the variation in uplift on each stiff-leg during the same movements of the boom with maximum load. In both cases there was either a pressure or an uplift force under the mast and stiff-legs, depending upon the positions of swing and load. This study was developed further into an analysis of the deflection of the traveler trusses under the derrick mast, with a maximum load of 9,000 lb. at the tip of the boom (4,600 lb. for load lifted and 4,400 lb. for weight of boom). The truss deflection was calculated with the derrick trusses supporting the masts directly over a center column of the new roof beneath, and also with the trusses set midway between column lines.

Removal of the concrete roof slabs, brick walls, windows and roofing was done by the Harvey Wrecking Co., Chicago. The dismantling and removal of the steelwork was performed by the F. K. Ketler Co., Chicago All planning and execution of the work were under the direct supervision of I. L. Simmons, bridge engineer, Chicago, Rock Island & Pacific Ry.

Steel Bridge Trends in Great Britain

THE TRENDS in the design of moderate-span highway bridges in Great Britain were briefly reviewed in a paper before the International Congress for Steel Development in London last June by T. C. Grisenthwaite, of the Foundation Co. Ltd. The steel used is ordinarily of mild quality with a tensile strength of 28 and 33 tons per sq.in., for which the 1933 specifications permit a working stress of 9 tons per sq.in.; they also permit joist and plate girders encased in concrete to be designed for a unit stress of 10 tons per sq.in., calculated on the strength of the steel alone. Because of the Road and Rail Traffic Bill of 1933, requiring the rebuilding or strengthening of bridges over railways, this type of work probably will be very active in the next few years.

The steel rigid-frame bridge has been but little developed in Great Britain, although the type is quite common in reinforced concrete. One steel structure being built at the present time spans four railway tracks on a considerable skew, the clear span being 86 ft. 10 in. The bridge is to be 50 ft. wide between parapets and will be carried on seven steel frames. The bridge is located in Oxfordshire. The frames are about 5 ft. 3 in. deep at the haunches and 2 ft. 9 in. deep at the center of the span.

Simply-supported plate girders are usually limited to about 100-ft. span. Cantilevers and arches, however, are replacing the ordinary Pratt or Warren type of through lattice-girder bridges in the interests of appearance. Numerous cantilevers resembling continuous girders, but with hinges placed at the points of inflection, to make them statically determinate, have been used. These multi-span plate-girder cantilevers have been built in numerous combinations of span lengths. For spans of approximately 100 to 250 ft., where the available depth of construction does not permit the use of a deck bridge, and where a through bowstring lattice-girder would formerly have been adopted, the tied arch is now coming into more general use.

Long-Range Planning Advocated by National Resources Board

Broad planning for the use of our land, water and mineral resources is recommended to the President in first report of federal board—Public works as an agency of recovery discussed—Extensive mapping proposed

THE NEED for broad and continuing planning in the use of the nation's natural resources and the possibility of using public-works construction as a means of reducing the fluctuations of business cycles are covered by the first report of the National Resources Board sent to the President on Dec. 1. The board was established by the President on June 30 of this year as the successor to the National Planning Board and the Committee on National Land Planning. It consists of Harold L. Ickes, Secretary of the Interior, chairman; Frederic A. Delano, vice-chairman; George H. Dern, Secretary of War; Henry A. Wallace, Secretary of Agriculture; Daniel C. Roper, Secretary of Commerce; Frances Perkins, Secretary of Labor; Harry L. Hopkins, Federal Emergency Relief Administrator; Charles E. Merriam; and Wesley C. Mitchell. The board has a staff consisting of a land section, with L. C. Gray as director, a water section, with Morris L. Cooke as director, and a planning committee on mineral policy, with Harold L. Ickes as chairman. Charles W. Eliot, 2d, is executive officer of the staff. The water planning committee (formerly the Mississippi Valley committee of the PWA) consists of Morris L. Cooke, H. H. Barrows, H. S. Crocker, Lt.-Col. G. E. Edgerton, Charles H. Paul, H. S. Persons and S. M. Woodward, with Thorndike Saville as executive engineer.

Only Part I of the board's report has been made public. It includes the findings and recommendations of the board and several sections elaborating on the findings and recommendations, including planning for our natural resources, public-works planning, and state and regional planning.

Land-use planning

The establishment of a permanent land planning section of the National Resources Board or its successor is proposed, with an advisory committee consisting of representatives of the federal bureaus primarily concerned. Among the functions assigned to this section would be planning for the continued retirement of submarginal land at the rate of about 5,000,000 acres per year for a period now estimated at fifteen years, the land being transferred to national and state forests, wild life refuges, Indian reservations, etc. In relation to subsistence homesteads, it is recommended that the land planning section give early attention to providing types of credit necessary for an adequate system of land settlement, and that no steps be taken to facilitate any considerable movement of unemployed people from urban areas into commercial agriculture. State participation in the planning and development of reclamation projects is proposed, and it is recommended that the national policy should be to complete and perfect old developments so far as practicable before undertaking new ones; also, that no federal project be undertaken until its economic feasibility has been thoroughly studied.

It is proposed that erosion-control policies be laid down that aim at the establishment of control measures on all the most seriously eroded areas within ten years and effective checking of erosion in twenty years.

Water-resources planning

A permanent water planning section is also proposed, with the following functions:

(a) To assemble promptly the basic data needed for planning the uses of water that now exist in scattered places, and initiation of whatever researches are needed to provide additional data.

(b) To proceed as rapidly as is compatible with thoroughness to develop constructive programs for the uses of the country's water resources in the public interest, and for safeguarding that interest against dangers threatened by water.

(c) To make the fullest use feasible of the specialized knowledge and experience possessed by existing public agencies—municipal and state as well as federal.

(d) To investigate water pollution in all its phases, including the effect of pollution on fish and other forms of aquatic life and organisms.

The board recommends that the present water planning committee make detailed engineering, social, financial and legal studies of water projects as follows:

1. The Connecticut River project in Vermont, New Hampshire, Massachusetts and Connecticut.
2. The Delaware River Basin in New York, Pennsylvania and New Jersey.
3. The St. Lawrence, and the development of coal-generated, mine-mouth power in Pennsylvania.
4. The Potomac River in Pennsylvania, Maryland, Virginia, West Virginia and the District of Columbia.
5. The Red River in Minnesota, North Dakota and South Dakota.
6. Missouri Basin, involving the Kansas City flood-control projects in Kansas and Missouri.
7. Ohio Basin, in relation to the Pittsburgh flood-control project in Pennsylvania, New York and West Virginia.
8. The Kanawha - Greenbrier - New River in West Virginia, Virginia and North Carolina.
9. The Caddoa Dam and Reservoir on the Arkansas River in Colorado.
10. The Conchas Dam and Reservoir on the South Canadian River in New Mexico.
11. The Fort Reno Dam and Reservoir on the North Canadian River in Oklahoma.
12. The Brazos Basin project in Texas.
13. The Coldwater-Yazoo River project in Mississippi.
14. The St. Francis project in Missouri and Arkansas.
15. Colorado Basin.
16. The Central Valley in California.
17. The Columbia Basin in relation to the Grand Coulee High Dam irrigation and power project.

It is proposed that these studies be started as promptly as possible and prosecuted vigorously, with intent to reach early decision regarding the wisdom of carrying out the project in question. Further, that working plans for actual construction be made for those projects that are approved by the committee. In this work it is proposed that the studies and programs for adoption by Congress be prepared on the basis of whole drainage basins, and that the studies be extended to determine the division of responsibility and cost among federal, state and local authorities.

Mineral resources

It is recommended that the federal government assist the mineral industries to attain economic stability in order to minimize waste of natural resources, maintain reasonable wage standards and protect investments. Collective organization and action by the industries is proposed, also industry control under public supervision of capacity, production, stock, and sometimes of prices. Promotion of scientific research relating to minerals by the government is recommended.

Public-works planning

Establishment of a permanent Public Works Administration is recommended, based upon the powers, duties and functions of the Emergency Administration of Public Works. The Federal Employment Stabilization Office would be merged with the permanent administration, and the functions of the latter would include:

(a) Preparation of a six-year budget of construction or longer-range program of public works, revised annually, for submission through a works program committee to the President and the Congress.

(b) Negotiation of agreements with local, state and regional authorities gov-

erning extent and method of federal participation in public-works projects within general limits to be prescribed by Congress.

(c) Allocation of a lump-sum appropriation among construction agencies, federal, state and local.

Within the permanent Public Works Administration there would be established a works program committee to approve programs, negotiations and allocations, and in general to coordinate projects and programs from different points of view, such as unemployment and physical development of resources.

To supplement the work of the permanent administration, the present board proposes that a series of advisory planning committees of the proposed National Planning Board be established for continuous study of public-works projects in such fields as water, roads or buildings, and for the formulation of long-range plans and programs in cooperation with state, regional, and federal agencies. It is further proposed that legislative procedure on public works be developed as an extension of the well-established methods now used for rivers and harbors, public roads, etc., involving:

(a) Approval by Congress of a six-year program or longer-range plan, revised annually.

(b) Appropriation of a lump sum by Congress for allocation by the President among projects included in the approved program.

(c) Authorization by Congress for the Administrator of Public Works to negotiate and approve agreements with local, state and regional authorities within limits prescribed by Congress and approved by the President.

Expanded mapping program

It is recommended that the standard maps of the United States be pushed to completion within ten years as a federal project with initial appropriations at the rate of $15,000,000 annually. Assistance also should be provided in the preparation of basic studies relating to water and land resources, including climatology, soil erosion, soil classification and groundwater, and the gaging of rivers and other recording operations covering the principal streams.

State and regional planning

The board recommends that the states should be encouraged to establish permanent state planning boards and to develop as promptly as possible adequate state planning programs. Assistance in state planning work and in either state or regional planning is stated to be one of the important obligations of the proposed National Planning Board.

Basic data for planning should include a financial balance sheet for the federal government to be set up and maintained by the Comptroller-General. A mid-decennial census of population and employment should be taken during the next year, and techniques should be developed for reliable estimates of population and en loyment in periods between the years when the census is taken.

Establishment of an advisory national planning board is proposed, the board to consist of five members appointed by the President "to serve as a general staff for the Chief Executive" and to act as "a board of strategy."

Construction operations

With the establishment of a permanent Public Works Administration, the report proposes that cooperative projects undertaken jointly by state and federal interests and some of the work now done by the Bureau of Public Roads and the Corps of Engineers in relation to flood control and similar projects, in so far as planning and supervision are concerned, would come under that body. With this plan in effect the direct construction activities of the government would be benefited by pooling all engineering talent and construction experience, possibly through the organization of a "Construction Service" in the Interior Department. This service would carry on the work now done by the Office of the Supervising Architect, the river and harbor work of the Corps of Engineers, the construction work of the Reclamation Service, and the direct construction now handled by the Bureau of Public Roads.

Public construction and employment

In discussing the amount of public works available for use as a check against extreme fluctuations in business cycles, the board has reviewed census and other statistics for construction during the past decade or so and makes the following statement:

"According to the estimates of the Federal Employment Stabilization Board, the total volume of all construction work done by the American government reached a peak in 1927 or 1928. In both years the dollar volume of all new construction was a little more than three billion dollars. . . . At the prosperity peak of the 1920's, private construction, as estimated by different experts using different materials and methods, attained a level of ten or perhaps twelve billion. In no year of the boom period did public construction make a third of the total for all construction work. A quarter of this total is a fair figure to keep in mind.

"Another approach to this problem is to consider, not dollar value or output, but number of men employed. On that basis it seems that in 1929 about three million men were employed in construction work, on the maintenance of roads, etc.; four and one-half million were employed in transportation, eight million in trade, nine million in service industries, ten and one-half million in farming, and eleven million in manufacturing. Altogether about 49,000,000 persons claimed gainful occupation in the census of 1930. Thus the construction workers made about one-sixteenth of this total, and, if a quarter of all construction workers were employed on public works, they made about 1/64th of the whole number of gainfully employed.

"The basic fact revealed by these figures is that the construction of public works formed a minor fraction of American industry even at the crest of the recent building boom—one of the greatest in our history. Federal construction work made only 11 per cent of all public construction in 1929, and only 3 per cent of total construction, public and private."

In discussing these figures the report points out that construction work exercises an influence upon business cycles much greater than its relative volume suggests and expresses the belief that public construction can be made a more potent factor than it has been in the past by wise planning and resolute administration.

Future volume of public works

"Based solely upon extension into the future of the average annual capital outlay of the entire United States (national, state and municipal) of about $2,400,000,000 for the ten years, 1921 to 1930," the report states, "the total capital outlay for the ten-year period 1935 to 1944 may be estimated at approximately $24,000,000,000. Of course, such an extension of a past average makes no allowance for the factor of growth which has been so notable in past American expenditures upon public works and which presumably should and will continue in the future. Hence the ten-year total suggested may be regarded as a minimum estimate.

"Extension of the public works into new fields and expansion of all public works, old and new, into the fields of reasonable possibility from the point of view of useful public service, brings the estimate of magnitude of all public works over a period of perhaps 20 to 30 years to about $105,000,000,000, or about 3½ to 5 billion dollars a year."

The board adds that "Whether five billion dollars a year for roads, parks, sewers, public libraries, forests, waterways, good housing and countless such other facilities is more than we should spend is a problem which we shall have to solve in the light of future developments touching the national income, public finances, modes of combating unemployment, popular demands for pleasures and protections afforded by public works, etc."

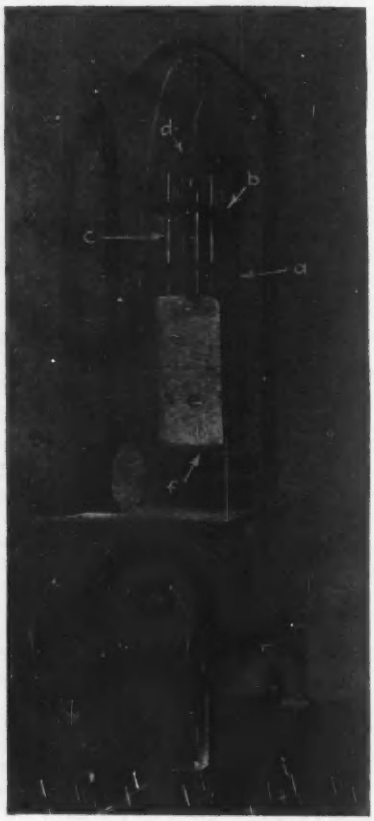
The foregoing is abstracted from Part I of the report of the National Resources Board. The parts yet to be published are: Part II, Report of the Land Planning Committee; Part III, Report of the Water Planning Committee; Part IV, Report of the Planning Committee for Mineral Policy; and Part V, Report of the Board of Surveys and Maps.

From Job and Office

Device for Measuring Length of Pavement Cores

By F. V. Reagel
Engineer of Materials, State Highway Dept., Jefferson City, Mo.

A SIMPLE DEVICE for measuring core length in checking pavement thickness is being used successfully by the bureau of materials of the Missouri state highway department. As shown by the illustration, the device is mounted on a heavy table to which is fastened a block of wood that serves as a stand for the core and supports a steel-plate upright *a*, 19x5x⅜ in. To the top of the upright is bolted a channel shape *b*; spaced holes in the upright and slotted holes in the channel permit height adjustments. Through the channel flanges are holes for five measuring rods *c*, which are threaded through a 4½-in. round plate at the center and at the quarters of the circle. This plate has a bail *d* by which it is lifted and so lifts the rods.

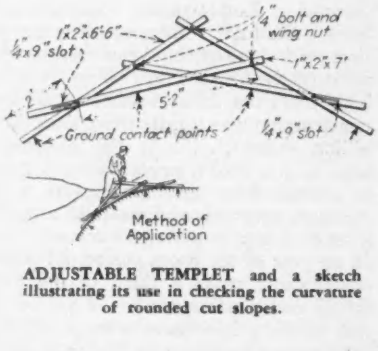


NINE-INCH concrete core ready for measurement. The 3-in. high steel block is used as a base when measuring 6-in. cores with the same setting. The calipers in the foreground are used to obtain the diameter of the specimen.

The core *e* is set top down on a base plate *f* with a V-notch in the front edge; the core is marked opposite the V-notch so that the length tests can be duplicated or checked precisely. The measuring rods are lowered onto the core end, a light spiral spring on each insuring close contact. The rods, graduated for 3 in. (in inches and tenths), are then read; the specimen is given a three-eighths turn, and the rods are read again. The sum of the ten readings divided by ten gives the average length of the core. When the device is adjusted for long cores and a short core has to be measured, the shim-block *g* is used. In practice, one of these devices is carried on the core-drill truck and another is in the laboratory, where the cores are sent and the field measurements checked. The calipers are used for measuring core diameters.

Rounding Off Slope Tops on California Highways

A SIMPLE DEVICE in the form of a light templet made up of four pieces of 1x2-in. lumber, 6½ and 7 ft. long, is used by the California division of highways for a guide in rounding off the tops of cut slopes. Started in the summer of 1934 as a means of employment for more hand labor on road work, this device was found to have other advantages and now is being used on many parts of the state highway system. It prevents the raveling off of



ADJUSTABLE TEMPLET and a sketch illustrating its use in checking the curvature of rounded cut slopes.

the slope tops and gives a smoother and more finished appearance to highway cuts.

The four pieces of wood are bolted together, as shown in the illustration, in an interlocking set of triangles. By loosening the bolts at all five points of connection the curve can be adjusted as may be desired within the limits of the length of slots provided for the two lower bolts. When the desired curvature has been selected and the templet adjusted accordingly, all bolts are tightened up. The assembly is not only rigid but very light and easy to handle.

When the ground surface has the desired curve, the four points of contact, indicated by arrows in the drawing, will just touch the ground. These templets are built up in three sizes, with subtangent lengths of 3, 4 and 5 ft., which are considered sufficient to meet the ordinary conditions.

Pneumatic Rivet Passers on San Francisco Bridges

RIVETS for both the Golden Gate and the San Francisco-Oakland bridge towers are delivered from the heating forges to the riveters by compressed air. Designed originally for use in shipyards where rivets often must be driven in enclosed spaces walled off from the rivet heaters, the pneumatic rivet passer is new to structural bridge work. Each unit consists of a cone-shaped reservoir placed at the forge, a

DISPATCHING END (above) and receiving end (below) of pneumatic rivet-passing equipment used on the San Francisco-Oakland Bridge.

suitable length of flexible steel tubing and a receiving receptacle in the hands of the bucker-up. The heated rivet is dropped into an opening in the reservoir, and its weight opens a flap valve which closes after it through the action of a counterweight. The operator then releases a blast of air that carries the rivet through the tubing at a speed of about 15 ft. per second. The receiver is a metal cylinder containing a spring element that cushions the impact of the rivet.

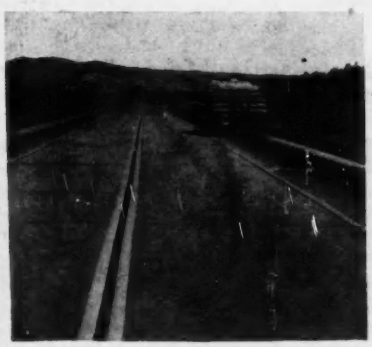
The pneumatic rivet passer is designed for efficient vertical transportation up to 125 ft. The flexible tubing has an inside diameter of 2 in., which provides sufficient clearance around the rivet head to prevent the delivery velocity from being too high. Greater safety and lower costs are claimed for this equipment. It delivers rivets to points relatively inaccessible. Heat losses are claimed to be reduced while the scale is removed from the rivets as they slide against the walls of the tubing in transit.

Highway Safety Increased by Contrast in Center Stripe

ANALYSIS of accident causes on a heavily traveled four-lane highway in California led to the conclusion that safety would be increased, particularly in night driving, if the central traffic stripe, which indicates the safe limits of travel for vehicles moving in opposite directions, could be made to stand out more sharply. Accordingly, the decision was made to change the center-line marking from a single white stripe to the three-stripe type shown in the accompany picture. This is still in the experimental stage, but highway officials believe it has unusual merit.

The new center stripe consists of three painted bands, each 4 in. wide. The two outer stripes are white, separated by a central black stripe. This combination gives more of a color contrast at night than would an orange and white combination.

California has experimented with various types of central markers in the form of longitudinal ridges or raised bands in the pavement. Although very effective for low speeds, these involve a certain element of danger at high speeds, and sentiment at present is that the painted marker is better. Standard practice is to make the traffic lanes 10 ft. wide from center to center of the 4-in. traffic stripes.



BLACK AND WHITE traffic stripe on the center line of a four-lane highway.

Dump-Truck Stability Increased by Dolley at Rear End

IN THE QUARRYING operations carried on recently in San Gabriel Canyon near Los Angeles, in connection with the construction of the San Gabriel No. 1 flood-control dam, very extensive trucking was required in the process of hauling large quantities of heavy material and dumping it over embankments. In new fill at the edge

TRAILING DOLLEY on rear of dump truck. When the dolley wheels begin to take weight in the dumping process, overbalancing of the truck becomes impossible.

of such dumps there is always some risk of overbalancing the truck as it tilts a heavy load and the rear wheels settle into the soft material when the load is concentrated upon them. Settlement of the rear wheels brings the truck's center of gravity still nearer to the dangerous point. After a few accidents from this cause a device was tried out that is reported to have been eminently successful in safeguarding the trucks against overturning while in the process of dumping.

The device consists of a dolley or pair of wheels on an axle attached to the rear of the truck. From the dolley axle and extending up to the rear of the truck body is a device consisting essentially of a piston in a dashpot. The shaft of the piston is connected to the truck body, and the cylinder is attached to the dolley axle. The shaft length is such that when the truck body is horizontal the dolley wheels are raised a few inches and hence do not come in contact with the ground while the truck is in transit. When the body is tilted, the shaft (and with it the dolley and piston) is lowered until the dolley wheels rest on the ground. From this point on the piston moves downward in the dashpot. As the weight of the entire device is about 800 lb., gravity serves to keep the piston always at the upper end of the dashpot until the truck body moves it downward. A spring-controlled ball valve in the piston allows oil to flow quickly through a relatively large opening in the piston head when the piston tends to rise toward its upper position; but when the piston tends to move downward toward the lower position, the pressure closes the ball valve and the piston can move only so fast as is permitted by the flow of oil around the piston through a small bypass tube leading from the top to the bottom of the cylinder. The rate of flow in the bypass, of course, is set at a predetermined amount.

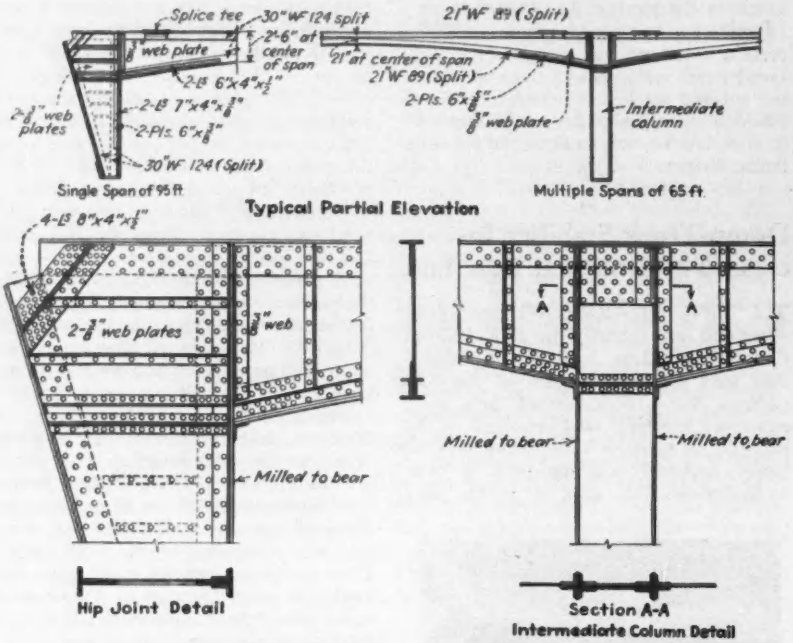
The cylinder is about 13 in. in diameter, and the piston has a stroke of about the same length. The wheels are built up of ½-in. steel plate with a solid hub welded in to give a bearing for each of the two shafts by which the axle is attached to the truck frame. The shafts are formed of two steel angles fastened together by longitudinal welds along their contacting edges, thus forming a member with a box-shaped cross-section. Each shaft is attached to the rear end of the truck frame by a swivel eye.

Although work on these dollies was done in the mechanical shops of the West Slope Construction Co., contractors on San Gabriel Dam No. 1, credit for the design is given to George Dusler, automotive engineer with the Mack Truck Co.

New Design Developed for Steel Rigid Frames

AMONG the numerous rigid-frame bridges built in this country during the past ten years, relatively few have been of structural steel. One reason for this has been the difficult and costly detail used at the knee joint, where the girder and end post have been made continuous by bending the girder flanges (involving heating and annealing) and by the use of radial ground-fit stiffeners. As an alternative, Weiskopf and Pickworth, consulting engineers, New York, have recently developed a new design involving application of their tee or split-beam flange-girder principle (*ENR*, Oct. 29, 1931, p. 686).

In this new design, as shown in the accompanying sketch, split-beam flange members constitute both the girder and the vertical end post; for multiple spans it will be noted that wide-flange rolled sections constitute the intermediate columns. The use of split-beam flanges permits the capacity of the flanges to be developed by rivets in the short lengths available at the joints. At the knee joint the bottom flange of the girder bears directly against the inside flange of the end post, being resisted by horizontal angle stiffeners. The top flange of the girder extends over the



DESIGN for steel rigid-frame bridge which eliminates the radial stiffeners and curved flanges at the joints. Girders and end posts are of tee-flange type.

end post and connects to the flange of the latter by means of a tension tie. At the intermediate columns the top flange is continuous, while the bottom flanges bear against the vertical post members as before.

By this design, fabrication is made easier, and, it is claimed, a saving of steel results. Elimination of coverplates with the necessary punching and riveting is an advantage. The clear flanges facilitate the floor installation and tend to improve the appearance of the structure; it is pointed out that this clean-cut appearance may be accentuated by designing the girders of the exterior frames of a bridge with plain webs, devoid of stiffener angles.

Wheelbarrow Tray on Handtruck Serves as Scoop

WHEELBARROW trays that are mounted on handtrucks, with the back of the tray placed forward, serve as scoops for unloading bulk cement from boxcars at the central mixing plant of the Walsh Construction Co. on the Syracuse grade-crossing elimination project. The cars are spotted opposite a hopper, which dumps into a screw conveyor leading to the plant. About a third of the load is shoveled by hand directly into the hopper. The remainder is transferred to the hopper by these handy-wheeled scoops.

WHEELED SCOOPS for unloading bulk cement from boxcars.

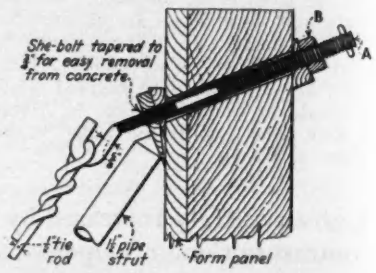
Heavy Concrete Form Bracing on Boulder Dam

IN PLACING FORMS for successive pours of concrete in Boulder Dam, struts and ties of the size ordinarily used to support the form panels were not considered heavy enough, and a more rigid form of construction was used, as indicated in the accompanying illustrations. For the most part the forms are wood panels, in some locations faced with sheet steel and held together by heavy vertical studding on the outside. for inward thrust or compression members, to prevent the panels from coming inward prior to pouring, lengths of 1½- or 2-in. standard pipe are used while the outward thrust or tension members, to hold the pressure of fresh concrete within the forms, are carried by heavy tierods.

These tierods, instead of being the usual twisted wire, consist of ½-in. plain steel reinforcing rounds. At the lower end the ties are wrapped around projecting loops of rods embedded in concrete of the previous pour, and at the top they are looped over hooks projecting from tiebolts adjustable outside the panel.

The hooks supporting the ties are

HEAVY TIERODS used to anchor Boulder Dam form panels



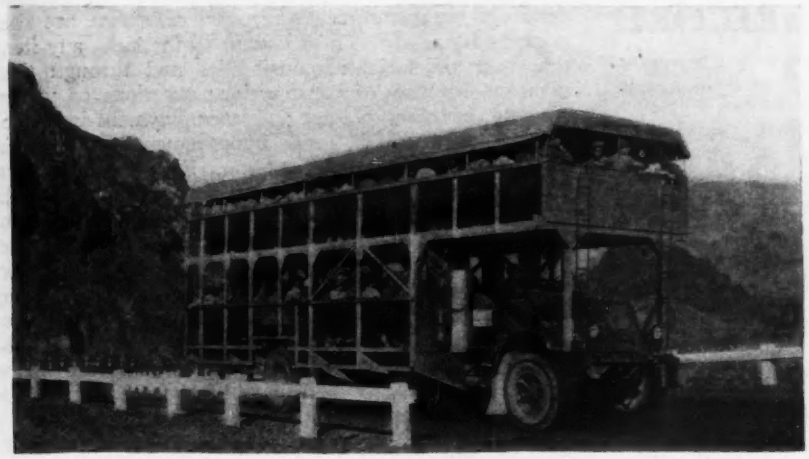
ELEVATION through bolt showing details. Position of the hook is adjusted by turning the bolt *A*. Assembly is locked in place by tightening up on nut *B*. When forms are removed, *A* and *B* also are recovered for re-use.

⅝-in. steel rods with threaded outer ends and, prior to the placement of the tierods, these hooks are threaded in a she-bolt that is thrust through the panel from the outside. The outer end of this she-bolt also is threaded, carries a nut and washer as well as a transverse pin fastened permanently at the outer end of the bolt.

With this arrangement the hook can be pulled up to the desired position by preventing the hook from turning while the she-bolt is turned outside the panel. This is done by a special wrench fitted over the pin at the outer end of the bolt. After the hook is set as desired the assembly is fastened firmly in this position by using a wrench to turn up the nut against the outside of the timber panel.

Large-Scale Motor Transport for Boulder Dam Workmen

EVERY DAY at Boulder City three shifts of several hundred men each are transported over the 9-mile highway to the operations at or near the dam. Transportation is provided by Six Companies Inc., and the only rules with which the workmen must comply to make use of the transport service are those concerning promptness and safety. Although trucks have been converted into buses of several sizes, the novel



THIS BUS, seating 160 passengers, leads the transport train conveying workmen from Boulder City to Boulder Dam.

features of the motor-transport fleet are the large double-decker buses, one of which can carry 160 seated passengers.

The exact time of departure of each fleet is definitely established. Men go from the dining room by way of the lunch cafeteria to that conveyance which will take them to their particular designation on the work. When it appeared that some risk to life and limb was entailed by the tendency to delay in boarding the buses until after they had started, a strict rule was made that men would not be allowed to climb aboard after the buses were in motion. A deputy sheriff was stationed at the loading point, and for violation of this rule men were suspended three days without pay. This was a sufficient deterrent, and the transport trains move out like clockwork, led off by the largest bus and followed, at intervals of a few seconds, by ten to twenty others ranging in size down to small trucks equipped with benches carrying about 30 men. Cars in the transport train must remain in their relative position—no passing en route is allowed—and the maximum speed is 45 miles per hour.

Letters to the Editor

From the Educator's Viewpoint

Sir—May I take this occasion to congratulate you upon the splendid editorial which appeared in the Oct. 4, 1934, issue of *Engineering News-Record*, entitled "Lest the Essence be Lost." Those of us in administrative positions at educational institutions are having an enormous amount of pressure brought to bear upon us to sacrifice technological and scientific instruction for courses in commercial and general subjects. Quite often the greatest advocate of courses in advertising, salesmanship and other business subjects are alumni who have attained considerable success in their profession but who feel that their position in life would have been greatly improved had they known more about commerce and economics. Personally I am convinced that the same individuals without the basic engineering preparation would have remained all their lives either laborers or clerks. The critics of our curricula do not realize that the higher executive positions often go to individuals who have outstanding traits of personality rather than to those who know something of advertising or salesmanship.

In general, I believe the advice you gave in the above-mentioned editorial should prove extremely helpful in developing a saner mental attitude on the part of engineers now in practice.

A. A. POTTER,
Dean of Engineering,
Purdue University.

Lafayette, Ind.,
Oct. 19, 1934.

Bridge Economics

Sir—In your description of a highway viaduct of creosote timber with a concrete deck (*ENR*, Oct. 4, 1934, p. 429) the claim is made that this viaduct cost about half as much as a reinforced concrete design. In our own experience, a 1,700-ft. viaduct at Moose Jaw, Sask., was let for about $142,000 as opposed to a bid on creosote timber piles, wood deck, wood sidewalk and hand-rail with an asphalt coating on the planking, at $162,000. Creosote timber costs less in Oregon, and so does cement, steel and aggregate—aggregate probably not in excess of half, steel and concrete two-thirds.

If there is no reason why a long span is required in timber, there is no reason why a long span is required in concrete; and if the concrete trestle is built, its cost, in our experience, should be less than the creosoted timber. Such construction would require for economy somewhat longer panels, self-centering, described by the writer in his book "Elasticity, Structure and Strength of Materials," and flat plate floors such as were used in the Moose Jaw Viaduct, the bridge over the Mississippi at Wabasha, the Mendota Snelling Bridge, the River Rouge four-track railroad bridge and the Raisin River two-track railway bridge, the latter each of 50-ft. span.

It seems to the writer that too large a proportion of bridge and reinforced-concrete construction illustrated in our technical press furnishes examples of what is *not* rather than what *is* economic practice. In steel construction we have the continuous bridge fad with through continuous trusses requiring double the metal needed for economically designed simple spans. The allegation of economy is based upon incomplete theory which treats of moment and ignores shear. The weight of the maximum web member of the continuous span is frequently ten times as heavy as the heaviest web member required for a simple span. The law of shear and moment is unfavorable to the continuous truss because the greatest shear occurs at the point of greatest moment. In the simple span the shear is a minimum where the moment is a maximum. Hence light webbing and economic depth with arched top chords.

In reinforced concrete, uneconomic practice results from erroneous elastic theory. Our textbooks treated elastic resistance on the antiquated Hooke's law that change of form is proportional to the force. If we consider a suddenly applied load on a simply supported beam, the deflection is twice as great instantaneously as that occurring under a gradually applied load of the same magnitude. Hence change in form is proportional to the energy of the motion of the force and not to the force itself. When this antiquated absurdity is eliminated in technical treatises, it becomes a simple matter to correlate the elastic coefficients with specific heat, coefficient of expansion, ultimate strength, yield point, elastic limit, melting and vaporization points of the metals, latent heats, atomic weights and atomic numbers.

Little progress is being made today in economic design as compared to the period from 1885 to 1900. Competition in design combined with competition in price was then the rule. Today the attitude of many of our professional men when acting for the client seems to the writer antipodal to the interest of the client. If competition in design were welcomed instead of excluded, there would be a material improvement in the structures built and a reduction in the cost at the same time. Is it not time that competition be invited in major structures by our highway departments and the purchase of skill together with material be given consideration?

C. A. P. TURNER,
Consulting Engineer.

Minneapolis, Minn.,
Oct. 9, 1934.

ENGINEERING NEWS-RECORD

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December 20, 1934

More Public Works?

WE ASK the cooperation of our readers in a matter of national concern. When Congress meets next month, it will face the issue of whether the drive for recovery by a public-works campaign shall continue, and, if so, what must be done to make the campaign effective. The engineering and construction group, whose members are most intimately familiar with the facts underlying the issue, can give effective aid in deciding the answer. For this purpose—

Please checkmark your replies to the list of questions printed on page 21 of the Construction Reports Section of this issue (eleventh page following this), clip out the slip and mail it to Editor, Engineering News-Record, Room 2804, 330 West 42d St., New York City.

The history of the $3,300,000,000 campaign of the PWA is familiar to the readers of *Engineering News-Record*. They know how slowly the campaign got to work and how a multitude of exasperating obstacles made it fall far short of its purpose, in spite of giving employment to a million men.

Conditions today are not the same as those of eighteen months ago, when the first public-works legislation was passed. Clearly, the case for and against public financing of construction re-employment is entitled to new, independent consideration. In all probability the President will place the issue before Congress. Is it sound? Can a construction program be made rapid? Is it capable of being made a real emergency device for mass re-employment in the face of a roll of ten million idle workers?

If an additional public-works program is necessary today, its methods must be shaped by the lessons learned from the past year's PWA and CWA experiences—in finding and selecting projects, in establishing workable administrative conditions, in making the labor clauses constructive rather than obstructive, in drawing every possible existing agency of industry and business into the chain of recovery activities. How these lessons are applied will determine the progress of recovery under a new construction campaign. By aiding in their solution, our readers can render an important public service.

Active Plans for Progress

FOR THE FIRST TIME a solid, tangible program of work essential to the rehabilitation of construction is at hand. The Construction League has laid down a far-seeing plan, which if carried out will help us forward to soundness. Development of larger activities for public service and study of improved methods of meeting the demands made upon construction under this program will constitute a lasting contribution to progress. Particularly the emergency items of the program, directed against certain unsound practices and aimed at improving the details of the government's recovery campaign, are in all respects admirable. The program so far lacks any items that bear on social responsibilities and through these upon stabilization of construction; questions of worker security, including old-age and unemployment insurance, receive no mention, and improvement of financial methods has only minor position. Since both of these matters bear quite directly on cost reduction, they may be regarded as ultimate extensions of the long-range part of the program, for both are clearly of long-term kind, though they do not lack immediate present-day importance. It may be assumed that all necessary broadening of the program will develop from what has been done so far. The fully developed program, competently carried out, will assuredly put the league in the position of being in fact the sorely needed central forum and representative of construction. In the meantime the league has a man-size job in carrying out its emergency program, whose soundness and timeliness invite the active support of the industry at large.

Continue the Code!

ALL THE CURRENT PROBLEMS OF CONSTRUCTION, such as those embodied in the Construction League's program or those brought to light in the code authority sessions at Knoxville two weeks ago, lead to the compelling conclusion that the code must be continued beyond the June expiration date. The good of the industry at large and of each of its separate elements requires such continuance. Other industries, more fully integrated, may have had time to test the merits or demerits of code self-government; the scattered and non-coherent groups embraced in construction have not had time to do so. Indeed, as yet it is not clear to what extent these diverse groups can be brought together under one code and one administration. The NRA, it will be remembered, forcibly separated from the construction code not only the materials supply industries but also some branches directly occupied with field construction, such as work done with floating plant. Experience alone can tell whether this separation is sound or unsound. The labor problems of the field also are only at the beginning of the road toward solution. So, there is much still to be worked out in the matter of the construction code through practical trial. Only one conclusion is possible—namely, that all must strive to assure the continuance of the code, and must fight to win for the code the full support and faith of every construction interest, in order that its best possibilities may be realized.

Recurring Warning

THE HOTEL AT LANSING, MICH., that collapsed in flames a week ago and carried half a hundred persons to death and injury has counterparts in hundreds of cities. It was no more or less a fire hazard than thousands of group-housing structures that spot the streets of large towns and are multiplied beyond count in every great metropolis of America. All would burn as fast as Kerns Hotel at Lansing, and most of them are much less guarded against uncontrollable start of fire than this populous hostelry with its day-and-night service forces. Because of these buildings, masses of our city people live in desperate danger of chance fire despite all the safety resources that engineering and architecture can provide. Great areas of our large cities are exposed to

a disastrous sweep of conflagration from an accidental blaze and a strong wind. Perhaps, despite its horrors, conflagration is needed to clear the ground and arouse the action for fire-resisting housing that owners and building departments mutually neglect. The burned hotel at Lansing requires no searching explanation, it is merely an example of a fire possibility that exists widely and is as widely ignored. Question: Are we overbuilt?

Facts and Ideas on Resources

THE FIRST SECTION of the National Resources Board report, published this week, is of high interest to construction engineering, for it touches the vital concerns of this field almost throughout. It is also interesting to those who have looked forward to learn what might be accomplished through planning of public action, since the present report is the first result of such thinking to be published. For engineers the report is important less in the ideas and recommendations that it presents than in its extensive background of factual studies of water, land and mineral resources. These studies are only cursorily referred to in the present introduction and are to be reported fully in supplements—covering an inventory of the country's water resources, a comprehensive survey of land conditions and uses, and a study of the critical factors surrounding the mining industry. Though their review and appraisal must await the publication of these studies, it is already clear that they have fundamental value.

In essence the present introductory report, containing the opinions and recommendations of the board itself, appears as a light and airy superstructure of ideas erected without much coordination upon a solid base of factual investigations. Included among the ideas are many of timeliness and value, but there are also some that seem hastily considered or else are radical to the extent of appearing fantastic. The reader will find it hard to reconcile himself to proposals that certain responsibilities and functions of local governments be virtually federalized by control of subsidies, that an executive dictatorship over construction be set up at the expense of legislative judgment on public improvements, and that a great central planning agency be established to think out most of our national problems.

This agency, to function under the old name National Planning Board, is to be a "board of strategy" to advise the President; its members are to have "social vision in the fusion of American interests, techniques and ideals into sounder and more satisfactory national policies," and the board is to surround itself with staffs of "consultants from governmental bureaus, labor, agriculture, industry, the home *(sic)*, technical and scientific societies and other groups directly concerned with the sound formulation of the lines of our national progress." It all is a bit bewildering. The proposal seems to envision a modernized and regimented brain trust that shall regulate our destinies.

Fortunately there is little danger of adoption of these soaring ideas. But they do focus attention on the question of whether we are as yet ready to lay down any far-reaching lines of action in the field of natural resources. Knowledge of facts is so greatly lacking that for the present all attention ought to be centered on study and investigation. It is to be hoped, therefore, that means will be provided to carry forward the studies, particularly those of land and water resources.

Of very special concern to construction is the fact that the board also undertook to deal with public works. Public works, of course, are not natural resources, and their inclusion may be a hangover from the period prior to last July, when one of the predecessors of the present board, the National Planning Board, was in existence.

The public-works investigations are contemplative rather than factual, yet they, like the land and water studies, represent a valuable beginning upon a vitally important subject. Here again, however, the board ventures into light-hearted proposals for creation of new agencies and radically new procedures, for which it would appear that justification of knowledge is lacking.

Much fuller knowledge of public-works relations is unquestionably important, especially at this critical time, when large new programs of construction are being considered as a means of restoring the country's economic activity. Study of the subject should therefore continue, carefully and thoroughly; until a much better understanding of the many intricate problems of public-works construction is obtained, it seems unwise to plan out radically new systems of carrying on public improvements.

Starting on Grade Crossings

FOR THE FIRST TIME in history the railroads of the country are cooperating in the compilation of technical data from which a logical grade-separation program can be deduced. This movement was started by the new Association of American Railroads through the naming of a widely representative engineering committee headed by R. H. Ford of the Rock Island. Appointment of this committee is indicative of a new approach on the part of the railroads to the highway-crossing elimination problem. Heretofore, because they were compelled to bear a large part of the cost, they have opposed quite generally all efforts to lay down plans for an orderly elimination of grade crossings. As a result, there is nowhere a record showing grade crossings with the relative number of vehicles and trains passing, nor yet any general attempt to indicate priorities.

For the reason just indicated, the railroads seldom have proposed that any single crossing be eliminated. Some railroad men still feel it is a mistake to do it now, even though a 100-per cent federal grant may be forthcoming, as they feel that not long hence such help may be withdrawn, leaving the railroads committed to a plan for elimination. This appears to be a short-sighted policy. But the engineering committee that has been appointed is not concerning itself with policy; it is concerned with collecting and correlating the engineering data and not complicating the problem with policy or politics. In so limiting its work it has made a wise decision. Only good can come from a logical plan, with priorities and readiness indicated. Then, if federal funds are made available, the engineering committee will be in a position to say, "Here is work that is needed and that can be undertaken quickly."

If a grade-separation program can be set up on such a basis, it will be most welcome. Not all crossings need to be considered at once. If attention can be directed to the most urgent, and if close cooperation can be obtained between highway and railway officials in determining priorities and in fixing upon points where elimination can be obtained by relocation, the plan now being considered by the government for a large-scale program of grade-crossing elimination should get off to a good start.

CURRENT NEWS

Arizona Rights to Boulder Dam Storage Argued at Hearing

Disagreement results in Sec. Ickes directing basin states to cooperate in drafting new contract allocating water

(Washington Correspondence)

CONFLICTING opinions of Colorado River basin states, aired at the public hearing held Dec. 17 in Washington, on the proposed contract which would give Arizona rights to 2,800,000 acre-ft. from the river, resulted in Secretary of the Interior Ickes directing the states to cooperate in drafting a new contract for allocating water to Arizona. Brought together in the Secretary's office to consider the proposed contract, the basin states spent three hours in fruitless argument. At its conclusion, Sec. Ickes told all interests involved to abandon their "provincial views" and appoint delegates within a week to draft a substitute for the Arizona proposal.

Arguments at the hearing were limited to the contract proposed by Arizona. The six other basin states insisted that approval of the proposal would allow Arizona to benefit in the Colorado River basin project, without being bound by any of the limitations effective against the other states.

Opposition views

The upper basin states characterized the Arizona contract as a "raid on the river that would give that state an illegal, unethical and immoral advantage over other states in the basin." Lower basin states expressed the fear that giving Arizona the water asked without the state accepting any of the limitations imposed upon other basin states by the Colorado River Compact would mean that in the future when some of the water will have to be allocated to Mexico it would be all taken from their share. Both upper and lower basin states further insisted that should Arizona be allowed to draw any water from the Colorado it should also be required to become a party to the Colorado River Compact.

Arizona arguments

Against these arguments was the emphatic refusal of Arizona to enter the Colorado River Compact. The state insisted that such action would mean accepting as part of their allocation from the river, water they are already taking from the Gila River, despite the fact this stream enters the Colorado at a point where it cannot be diverted to any other state.

Before directing the states to draw a new contract, Secretary Ickes announced that he was impressed with the argument that Arizona wants all the benefits and none of the burdens attached to use of water from the Colorado. He further questioned the ability of Arizona to use the water it was requesting.

Just before the hearing ended Nathan

(Continued on p. 808)

Collapse of Steel Framing Kills Two Erectors on New School

A 13-ft. wide bay of steel column-and-beam framing in the new Bayside high school in New York City involving about 30 tons of steel and varying in height from 1 to 4 stories along its 75 ft. length was completely wrecked in a collapse on Dec. 13. Two steel erectors working on top were killed. According to available reports, the accident occurred immediately after a bundle of beams being lifted by a crawler crane swung against the steelwork. The bay which collapsed constituted the first steel to be erected in the south wing of the large building which will accommodate 3,600 pupils. It was not connected with the other parts of the building, on which the steelwork is practically complete, and therefore relied solely on its own bracing and guying for stability. Investigations are under way by the district attorney and the board of education, and a hearing is scheduled for Jan. 15 before the Queens County grand jury, to ascertain the degree of fitting-up that had been done and the amount of guying that was used.

The Bayside high school is being built with a $2,500,000 PWA loan. Work was begun last summer and it is scheduled to be completed by January, 1936. The general contractor on the job is Royal-Rice, Inc., and the steel is being erected by the Lieder Construction Co., both of New York.

Washington Notes

By Paul Wooton
Washington Correspondent

A NEW POST in the Department of the Interior, that of Under-Secretary, has been recommended to President Roosevelt by Secretary Ickes. The Secretary states that he has proposed the establishment of the new office to aid him in the Department's administration, but that he has not considered the appointment of any particular person nor the duties to which he would be assigned. Reports persist that Colonel Henry M. Waite, formerly Deputy Administrator of the PWA, is in line for the position.

It is generally believed that creation of the post will have the approval of the President, the Budget Bureau and Congress. Colonel Waite was in consultation this week with Secretary Ickes and PWA officials on preparation of the projected public works program for next year.

Allotments of $1,489,800 to the Coast and Geodetic Survey and $618,000 to the Geological Survey were made by the PWA this week. Without this allotment the Geological Survey would have run out of money for its field work by February. The allotment includes $348,000 for surveys to modernize navigation charts, $902,000 for triangulation and leveling work, and $239,800 for developing maps and reports from information compiled in the field. The Geological Survey's allotment will be used for continuing topographic surveys.

Western Lumbermen Request End of Code Price Fixing

West Coast lumbermen, at a public meeting before NRA officials in Washington Dec. 11, requested the termination of "provisions for lumber price fixing in their division." Several speakers declared that the code price structure had collapsed on the West Coast. The argument did not advocate abandonment of the code, but was based on the idea of making changes which would preserve the code and make it workable.

The petition upon which the hearing was called was presented only by the West Coast division of the industry, but representatives from other parts of the country were present to present arguments supporting or attacking the code price structure. In general, the attack on the code price fixing provision considered it unenforceable under present practice and contended that control had broken down to the point where "nobody pays any attention to the code."

Master Grade Separation Plan In Preparation by the Railroads

Preparation of a master plan upon which to base a program for the elimination of railway and highway grade crossings has been begun by a committee of engineers recently appointed by J. J. Pelley, president of the recently organized Association of American Railroads. The initial undertaking of the committee will be the preparation of a map of the United States showing the primary and secondary railways and the state highway systems upon which may be indicated the principal grade crossings between highways and railways. Subsequently, data as to density of rail and highway traffic at each crossing will be compiled. This will give the basic data from which to prepare a list of priorities.

The engineering committee is headed by Robert H. Ford, assistant chief engineer, Rock Island Lines, first vice-president of the American Railway Engineering Association. Other members of the committee are as follows: W. J. Backes, chief engineer, Boston and Maine R.R.; R. E. Dougherty, vice-president, New York Central Lines; W. D. Faucette, chief engineer, Seaboard Air Line Ry.; G. W. Harris, chief engineer, Santa Fe; J. L. Haugh, vice-president, Union Pacific System; C. F. Loweth, chief engineer, Chicago, Milwaukee and St. Paul R.R.; T. J. Skillman, chief engineer, Pennsylvania System; J. E. Willoughby, chief engineer, Atlantic Coast Line R.R.; S. L. Wonson, assistant chief engineer, Missouri Pacific R.R.

Mr. Ford has already perfected an organization in practically every state, usually with the chief engineer of the road most affected as chairman. Meetings in these states are being held with the district engineers of the Bureau of Public Roads and the state highway engineers.

The engineering committee will work in coordination with a committee on grade crossing elimination policy.

Code Authority Acts To Settle Dispute In Chapters' Overlap

IN ACCORDANCE with the authorization given at the meeting of the Construction Code Authority in Knoxville, Dec. 7, the chairman has appointed a committee of authority members to review the controversy between the mason contractors and general contractors regarding the scope of operations under the mason contractors' chapter, and its effect upon a general contractor who performs his own masonry work, and the related problem of payment of code assessments. This issue has been actively disputed for several weeks and previous attempts at conciliation by the code authority have failed.

Subsequently, the matter was taken to NRA which handed down an administrative order establishing the provisions of Administrative Order X-36, within the industry, upon the basis of which a general contractor performing masonry work would not be required to pay a separate assessment on his masonry work. Consequently, the mason contractors' code authority requested termination of this exemption granted to general contractors. This application was heard at public hearing on Nov. 15 along with nine applications from other code authorities in the construction industry, which similarly sought to terminate the exemption applying, in some cases, to members of the industry, but in most cases to members of other industries, who compete directly with contracting companies.

No decision was made by NRA on these applications and the situation became more complicated with a request from the mason contractors for a modification of Chapter VIII of the code to broaden the definition to include all masonry work by whomever performed. At present, the definition is limited to that "contracted for," which has resulted in limiting the application of the masonry industry's area agreement in New York City.

Settlement sought

The desire of the industry to settle these differences within the industry resulted in NRA postponing indefinitely the public hearing scheduled for Dec. 12, on the mason contractors' Code to (1) supplement the definition and (2) include minimum rates for skilled labor according to the PWA scale. The special committee appointed by the code authority held its first meeting in Washington, Dec. 19. Both sides of the controversy were represented and presented their respective cases. Also, other divisions of the industry interested particularly in the final decision on the question of assessments had been invited to send representatives, or present memoranda setting forth the situation with respect to their divisions.

There has been no statement as to when a determination will be made by the code authority committee with respect to these several issues.

Ruling on installation work

An important ruling has been handed down by NRA which may set a precedent in many similar cases and clarify the situation as to the application of the construction code. The Walker and Pratt Manufacturing Co., Boston, on application, was granted exemption by NRA from the wage and hour provisions of seven of the eight manufacturing codes which had claimed jurisdiction over its operations. Its chief line of business, NRA decided, was under the electrical manufacturing code which was given jurisdiction, but the company was instructed that its operations came under the jurisdiction of the construction code when it did outside work on its products which required the hiring of men in the field. This company manufactures electric, coal gas and combination ranges, steam and hot water heaters and does installation work on cast iron boilers and warm air furnaces.

The ruling supports the contention, long maintained by officials of the construction code, that installation of manufactured products, whether performed by a contractor or by the manufacturer, must be under the same code provisions in order that each of them, in dipping into the construction labor pool, would operate under the same wage and hour conditions, and therefore be on the same competitive basis.

Los Angeles Rainfall to Date Sets 45-Year Record

A storm that brought 1.77 in. of rainfall to Los Angeles in a 24-hr. period on Dec. 13, alarmed residents of the La Crescenta, Montrose and Arroyo Seco districts where heavy flood damage occurred a year ago. Although no serious damage resulted from the three-day storm, which ended on Dec. 14, the city's rainfall for the season was brought up to 8.09 in., the highest for that date since 1889.

Fifth Slum Clearance Project Started by PWA in Indianapolis

Slum-clearing operations have been started in Indianapolis on a PWA project which includes the building of a $3,000,000 housing undertaking covering about 36 acres. This project is the fifth to be undertaken by the PWA; two projects are under way in Atlanta, one in Montgomery and one in Cleveland. The Indianapolis project will be for negro occupants.

The new housing development will consist of 15 apartment buildings of three- and four-story height, providing 661 family units, and 92 row houses. Rentals will be established at a figure which will amortize the project over a long period of years. Construction will be fireproof and arrangements will provide ample yard and outdoor recreational space.

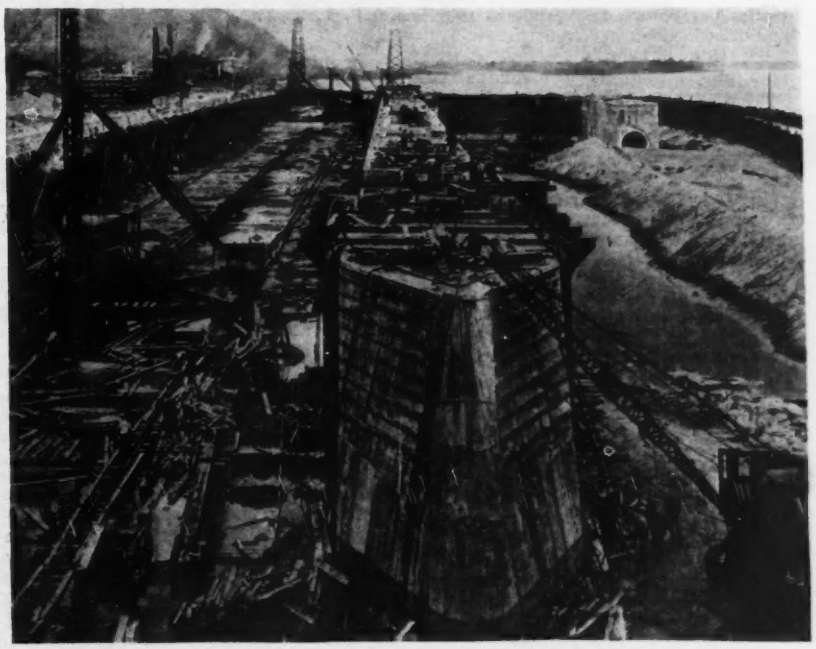
Slum Clearance Authority Planned for Atlanta, Ga.

Plans are being formulated for initiating legislation in Georgia to provide for an Atlanta Municipal Housing Authority with power to clear slum districts and build low-cost housing. The proposed legislation has been drawn and the program calls for consideration by the city council with subsequent presentation at the next session of the legislature.

As drawn, the bill would provide the housing authority with the right to issue bonds for financing slum clearance and power to administer the operation of low-cost housing developments. Five members have been suggested for the authority, which would develop and operate projects.

WORK ON LOCK NO. 7; PART OF THE UPPER MISSISSIPPI RIVER PROGRAM

Construction work continues on the several units of the upper Mississippi River 9-ft. canalization program being carried out by the U. S. Engineers. The view shows the stage of work on dam No. 7 which is located about 5 miles upstream from La Crosse, Wis. The entire program of navigation improvement is estimated to cost $94,000,000. The program was outlined and the locations of the 27 lock and dam structures were shown in an article in *ENR*, Mar. 8, 1934, p. 322.



Contractors Code Authority Presents Data From Questionnaire on Compliance

INFORMATION on the subject of code compliance in the construction field was presented by the Divisional Code Authority for General Contractors at the Knoxville meeting, Dec. 5-7. Reporting to the open meeting on a questionnaire sent to all state administrative agencies on Nov. 15, Louis W. Hickey, executive manager, tentatively summarized the composite replies as follows:

1. All states have appointed local cooperative committees or some other type of committee serving without pay for the purpose of securing code compliance, or contemplate doing so in the very near future.
2. The consensus of opinion is that the appointment of local cooperative committees is the proper way to obtain code compliance with the least possible cost.
3. Suggestions have been made that the general contractors who are now complying with the code be vested with the power to secure code compliance from other general contractors who are not quite so conscientious in their methods of doing business as the group who are adhering strictly to the provisions of the code.
4. Practically all state agencies have made continuous efforts to obtain the cooperation of governmental agencies and, with few exceptions, the agencies have been unable to obtain the necessary cooperation of the political divisions, or governments, in their states.

Hope for more effective code enforcement in the future was seen in the recent appointment of NRA Division Administrator Sol. A. Rosenblatt as director of field administration and enforcement. He has been given wide powers by the National Industrial Recovery Board, including the coordination of the compliance and litigation division of NRA with other governmental agencies such as the Federal Trade Commission and the Department of Justice. It was reported that plans are now being perfected by Mr. Rosenblatt for ten regional offices for the supervision of field activities.

On the subject of the general contractors' equitable and proportionate share of the expenses of the Construction Code Authority a temporary agreement has been reached whereby 10 per cent of the divisional code authority's total collections from Dec. 1 to Jan. 31, 1935, will be paid to the code authority, pending agreement for a permanent basis of contribution.

L. E. Palmer, of the finance committee, advised the members of the state administrative agencies that a percentage report of receipts and disbursements of the division code authority for general contractors has been prepared, based upon actual income, and that the divisional authority will distribute this report generally to the state agencies. It was also announced that the dollar-per-project return from the construction code authority, which is being remitted to state agencies in the case of all projects amounting in registered value to $10,000 or less, will be in addition to their minimum budgets, and for the purpose of encouraging the registration of small contracts.

Report Favors 3½-Mile Extension To Boston Rapid Transit Lines

The Metropolitan Planning Commission of Boston has filed a report with the Massachusetts Legislature on a proposed 3½-mile rapid transit extension from Forest Hills to the Boston-Dedham line. The route would provide for elevated train service from the center of Boston through Forest Hills and West Roxbury to Spring Street, utilizing the West Roxbury branch of the New Haven railroad beyond the present Forest Hills terminal. The estimated cost is $5,200,000. A plan for financing future rapid transit extensions at Boston is to be presented to the next Legislature by the commission in its general report.

First PWA Financed Power Plant Is Completed in Missouri

Formal dedication of the California, Mo., $139,000 municipal light and power plant on Dec. 11 marked the completion of the first city-owned power system in the state of Missouri to be completed with the aid of PWA funds. The city received a loan and grant of $145,000 from the PWA.

The project's legality was contested by the Missouri Utilities Co., which has served the city for a number of years. After an adverse decision in the local state court, the power company carried the case into the federal courts and United States District Judge Merrill E. Otis, Kansas City, held that Congress has the power under the public welfare sections of the Constitution to appropriate money as loans and grants to municipalities to be used in aiding unemployment relief. He refused to enjoin the city from building the light and power plant.

In this decision Judge Otis stressed the fact that the plaintiff company had no franchise to operate in the state of Missouri. Further, in his ruling, the judge pointed out that the California situation was distinctly different from that of the town of Concordia, Mo., in which case Federal Judge Albert L. Reeves of Kansas City had handed down an adverse ruling several weeks previously. In the Concordia case the plaintiff, the Missouri Public Service Co., held a city franchise, while the municipality based its defense on the commerce clause of the Constitution instead of on the point of general welfare.

Large Contract Awarded For Texas College Buildings

A construction contract was awarded by the regents of the University of Texas for a library-main building to the W. S. Bellows Construction Co., Oklahoma City, on a low bid of $1,589,605. A contract for $151,000 for a dormitory structure at the State Teachers College, Denton, was also awarded. Both buildings are being financed by PWA funds.

Separate Flood Control Board Proposed for Los Angeles County

Representative public organizations in Los Angeles are considering a plan for amending the existing law which established and governs the Los Angeles County Flood Control District to provide for an independent board of directors. At present the regular board of county supervisors is in charge of the flood control program and the new suggestion is based on the belief that the duties of the board are so numerous as to make it impossible for them to give the necessary study and detailed attention to the affairs of the flood control district. The suggested program would require the amending of the existing flood control act in the coming session of the state legislature. The plan will be to provide an independent board of directors for the district with authority to both plan and carry forward the flood control program.

Housing Advisory Council Named to Assist Program of FHA

A Housing Advisory Council of the Federal Housing Administration was appointed this week by Administrator James A. Moffett.

This council is composed of representative men who are authorities in the seven broad functions of the Federal Housing Administration: Architecture, construction, materials, labor, city planning, housing and finance. In the financial group are included representatives of trust companies, commercial banks, savings banks, building and loan associations and insurance companies.

Membership in the council consists of twenty-five men. These men are expected to hold full committee meetings on the average of two days a month, with more frequent meetings of the various sub-committees. Although they are expected to devote considerable time to the deliberations of the council, many of them have consented to serve without remuneration.

James D. Dusenberry, former president of the United Fireproof Construction Company and now director of the construction and real estate division of the Federal Housing Administration, has been named chairman of the council. The first meeting was held this week.

Higher Water Rates for PWA Loan Stops Improvement Project

As the result of a PWA requirement, that the minimum monthly charge for municipal water service be raised from $1 to $1.50, to secure a PWA loan for a rehabilitation program, city officials of Bentonville, Ark., decided to abandon the project. The work was to have provided betterments for the municipal water system financed by a $60,000 loan and grant from the PWA. The requirement of the PWA for the 50-cent-raise in minimum monthly charge was placed before a mass meeting of citizens, and the unanimous expression of opinion against this plan resulted in official decision to discontinue the plan. The city has been operating its own municipal waterworks and light and power plant for about 35 years and at the present time is has no bonded indebtedness against the property.

Private Bond Selling by Cities Does Not Affect PWA Grant

The sale of bonds to private investors by cities, counties or other public bodies, which have received loan and grant allotments from the PWA will not jeopardize the 30 per cent grant for these allotments, according to recent statement made by Administrator Ickes. He emphasized the fact that the grant will be made for the same amount, regardless of whether PWA buys the bonds or they are sold directly to private bond dealers.

With improving conditions in the municipal bond market, many localities have been receiving offers from private dealers for securities which communities had agreed to sell to the PWA, and the number of inquiries received by PWA state engineers and at Washington headquarters indicated that many localities were in doubt as to whether these offers, and resulting sales, might affect the PWA grants for the projects. The statement by Administrator Ickes was intended to definitely clear up this point.

The PWA now has on its books about 2,200 allotments of combined loans and grants to local public bodies. The PWA welcomes the sale of bonds to private investors, with resulting change in the allotment from a loan and grant to a straight grant, because this results in releasing money which can be reallotted to additional projects remaining on the waiting list. This type of change in public works financing has already released more than $50,000,000 which has been reallotted.

Housing Program Health Benefits Reported by U. S. Health Service

Definite evidence that the elimination of slum districts in cities and the provision of housing with adequate sanitary requirements will result directly in the improvement in public health has been announced by the housing division of the PWA, based on a report prepared for it by the U. S. Public Health Service. Pointing out that slum areas, in a sense, are relics of the period in which there were few sanitary regulations, the Public Health Service draws the conclusion that these areas facilitate the spread of disease to other sections of the community.

Among the conclusions reached by the Public Health Service were that:

1. Significant relations exist between certain diseases and poor housing.
2. Overcrowding in slum areas increases communicable disease, liable to spread to other sections of cities.
3. Lack of ventilation in slum homes and lack of sunshine in slum areas has an adverse effect on health.
4. Slums offer general fire menaces in many cities.
5. Poor housing is a public-health problem of immediate concern to health authorities.

"A third of our population lives in structures unfit for habitation," states Horatio B. Hackett, PWA director of housing, "a state of being which does not make steady foundations for the body politic. The United States is a latecomer in the housing movement, but we are now under way. The first steps have been the hardest, for we have been establishing standards, devising ways and means"

Steel Houses for Company Towns Suggested by Large Industries

A plan for the construction of 50,000 modern houses, with extensive use of steel, is being considered in the steel and coal industries. The program would involve housing costs totaling $150,000,000. As tentatively outlined, the work would involve low-cost housing construction in typical company or industrial towns where insanitary and antiquated houses would be replaced by modern homes built for about $3,000 on land already owned by the company. Sponsors of the plan assume that loans up to 8 per cent of the value of the houses could be obtained from the federal government, which would necessitate only a relatively small amount of private financing. The houses would be rented or sold to company employees on terms provided by the present government loan program, or about $21 per month over a period of 20 years for a $3,000 structure.

One of the most important elements in the promotion of this program would be the sale of 100,000 tons of steel to be used in this home-building plan.

Figures on Modernization Show 70 Per Cent for Homes

Single-family homes are far in the lead in the modernization program of the Federal Housing Administration for repair, alteration or improvement of real property, according to a breakdown of 44,809 insured modernization loans totaling $19,021,116.72, made public by Administration officials. The figures used are as of November 21.

Estimates based on private and governmental surveys made throughout the country show that for every insured loaned dollar spent on modernization five cash dollars have been spent. These estimates are borne out by reports made direct to the Administration by building supply dealers, contractors and large industrial concerns dealing in building material goods. Therefore, the total amount of modernization business done through November 21, according to these surveys, and including modernization loan expenditures, has reached a total of more than $100,000,000 in the fifteen weeks of activities under the modernization program.

In the list of properties improved by the owner, loans on single-family homes amounted to $13,181,376.41, or 69.87 per cent of $18,864,692.34; multiple-family homes, $3,024,021.64, or 16.03 per cent.

Indiana Plans Three-Lane Surface for National Road (Route 40)

Surveys are nearing completion, under the direction of the Indiana State Commission, for a highway improvement program which will ultimately provide a three-lane route for the National Road (Route 40) across the state. The survey is preliminary to speeding up the construction program as soon as funds can be allocated to the widening of the remaining two-lane sections of this highway in Indiana. About $500,000 is available for this work at the present time, and will be spent in widening the highway east from Richmond to Cambridge City and from Terre Haute west to the Clay County line.

International Sewer Proposed For Mexican-Border Cities

The International Boundary Commission on Dec. 3 met in San Diego, Calif., to consider the proposal that the governments of the United States and Mexico participate jointly in the construction of an international trunk sewer to serve the towns of San Ysedro, Calif., and Tia Juana, Old Tia Juana, and Agua Caliente, Mexico. At the present time Tia Juana and Agua Caliente empty their sewage into the bed of the Tia Juana River, while the other communities have no sewerage system. San Ysedro, Tia Juana and Old Tia Juana draw their water supplies from wells in the river bed below the sewer outlets. In view of the fact that for ten months of the year the river is merely a dry wash, a serious public health situation is presented.

To remedy the situation, the Board of Supervisors of San Diego County ordered E. R. Childs, county surveyor, to make the necessary surveys and to draw tentative plans for an international trunk sewer to drain the entire section and to convey the sewage to the ocean. It is proposed to build the trunk sewer as an international undertaking, leaving the several communities to construct their own interior systems or to connect those already built. The project is estimated to cost $100,000 and if a permanent outfall in the ocean is to be constructed also, the cost will be about $50,000 more.

At the meeting of the International Boundary Commission the only protest heard was from the owners of the land where the outfall is proposed. At this point a syndicate owns about 3,000 acres on both sides of the line. Spokesmen for the syndicate objected to the temporary outfall but offered no protest to the proposal to build a permanent outfall at once. The commission has as yet made no announcement of its findings.

Disregard of Code Requirements Causes Cancellation of Bid

All bids submitted for furnishing and installing the accessory lighting arrangements on the New Orleans Public Belt-Louisiana Highway Commission bridge across the Mississippi River at New Orleans were canceled by the Public Belt Railroad Commission on receipt of instructions from the Reconstruction Finance Corp., based on grounds that the low bidder had failed to comply with code requirements. The low bid of $60,759 was presented by the White Way Corp., Milwaukee, Wis., and the contract was tentatively awarded to this firm, subject to the approval of the contract by the RFC. Subsequent action resulted in annulling all bids and the work will be re-advertised.

The statement of the case issued by the RFC contains the following: "With respect to the bids for lighting contract, the Corporation (RFC) declines to consent to accept the bids of the White Way Corporation due to finding of code violation by code committee and determination of the National Industrial Recovery Board, acting as agency empowered under Executive Order 6646, that such bidder has violated code. The Corporation also declines to accept any other bid in view of the large amount ($28,000) by which the low bid is less than all other bids."

Urge Better Sewage Disposal For Danvers River Region

An exhaustive report recommending comprehensive improvements in the disposal of sewage in the Salem-Peabody-Beverly (South Essex Sewerage) district of Massachusetts has been filed with the legislature of that state by a joint board composed of the state departments of public works and of health. The board was ordered by the last Legislature to investigate the condition of waters in the Danvers River and Salem and Beverly harbors, and to determine the necessity of changing the present methods of disposal and to prevent the accumulation of grease on these waters and adjacent shores from sewage and industrial wastes. A collateral inquiry dealt with the proposed filling in of the North River canal and the removal of surface water discharged into it by a pipe line.

The joint board's report shows that the North River in Salem and Peabody is the most grossly polluted stream in the state, due chiefly to the discharge of industrial wastes into it from the tanning and leather plants of Salem and Peabody.

The investigation shows that the equipment at the Salem-Peabody pumping station is inadequate. Additional works, consisting of suitable screens and skimming devices, works for removing certain objectionable suspended and floating matter, and a deeper and larger pump well and new pumping machinery of increased capacity are recommended. The Salem-Peabody trunk sewer, if properly operated, is held to be adequate for existing needs, but the board asserts that certain portions of the Peabody sewer system should be enlarged and portions of the Salem system reconstructed to exclude storm and tidewater. It also appears that multiple outlets with an extension of the existing outfall sewer into deeper water may have to be provided in the near future. A system of outlets into the Danvers trunk sewer of the Essex district is also advised.

Under maximum conditions of flow over 40 m.g.d. must be disposed of at the Salem-Peabody pumping station. In spite of the treatment of industrial wastes (especially from tanneries) discharged into the sewers of Peabody and Salem, the sewage reaching these places still contains large amounts of suspended matter and fats. The deficiency in pumping station capacity contributes to the backing up of sewage in the main trunk sewer, resulting in deposits of solid matter and reduction in sewer capacity. The machinery in this station has an effective capacity of about 25 million gals. in 24 hours, and then for a short time only. Objectionable local conditions result from the backing up of sewage.

Solid Tired Vehicles Banned From Virginia Highways

After April 1, 1935, solid tired vehicles are to be banned from Virginia highways, according to an announcement of the state highway commission on Dec. 15. The only exceptions will be for electrically-driven vehicles and municipal equipment. This resolution extends the provisions of an existing state law which prohibits the use of solid tires on highways without permit from the state highway department.

Arizona Rights in Colorado River Argued at Washington Hearing

(Continued from p. 804)

Margold, solicitor of the Department of the Interior, asked the Arizona representatives if they would be willing to resign the privilege of appropriating additional water from the Colorado River in the future if they were given the 2,800,000 acre-ft. they now ask. He was told that such a proposition would be carefully considered.

Views of compact states

Opening the hearing for the upper basin states, W. W. Ray, special counsel for the state of Utah, went back into the history of the Colorado River Compact to point out that Arizona had fought against that agreement for the development of the river. He explained that the compact was the foundation of the law under which the federal government took over the river development. The upper basin states counsel contended that now that Congress had approved the Colorado River Compact, in passing the Boulder Dam bill, Arizona was seeking the benefits of that project without any responsibilities or burdens.

Phil Swing, of the Imperial Irrigation District of California, presenting the case of the lower basin states, declared that approval of the contract proposed by Arizona would put the United States in the position of aiding that state to violate the provisions of the Colorado River Compact, to which contract the United States is already a party. He insisted that California's right to the water it is to receive from the Colorado is a vested right entitled to the protection of the federal government. He expressed the belief that the amount of water Arizona requested was excessive and would imperil the government's ability to meet the contract obligation to California. "The United States must protect itself and other Colorado basin states by a proper provision to take care of any future Mexican treaty obligations," the witness argued. "Unless this is done the whole Mexican burden might fall on California."

Charles C. Carson, special attorney for Arizona, led the argument in support of the proposed contract. He explained that California is bound by contract not to exceed 4,400,000 acre-ft. of water from the Colorado River from the 7,500,000 acre-ft. that the upper basin states are bound to send down to the lower basin. Figuring 300,000 acre-ft. for Nevada, the only other lower basin state, he insisted that if the remaining 2,800,000 acre-ft. were not allocated to Arizona it could be used nowhere else in the United States.

The Arizona representative, in response to questions asked by the secretary, said that Arizona is now drawing from 2,500,000 to 3,000,000 acre-ft. of water from the Gila River. J. M. Ross, vice chairman of the Arizona Colorado River Commission, continued the argument for the contract. He explained that the reason Arizona did not and would not ratify the Colorado River Compact was that it would result in the state getting only water to which it had access before the compact was drawn and none from the Colorado River itself. He argued that under the compact Arizona would be required to accept all water that it takes from the Gila on its allocation from the Colorado. He said that Arizona would consider anything that did not involve ratification of the compact.

William Hubert Burr Dies; Retired Teacher and Consultant

William Hubert Burr, former professor of civil engineering at Columbia University and for many years a consultant on engineering projects of national importance, died in New York on Dec. 13 following an illness of several months. He was 83 years old.

Professor Burr was born in Watertown, Conn., in 1851 and graduated from Rensselaer Polytechnic Institute in 1872. After graduation he spent three years in bridge and water supply work and then returned to R.P.I. as an instructor and then as professor of rational and technical mechanics from 1875 to 1884, continuing to practice engineering as time permitted.

Leaving R.P.I. in 1884 Professor Burr became assistant to the chief engineer and then general manager of the Phoenix Bridge Co., 1884 to 1891. In 1892 he returned to teaching, first at Harvard for a year and then at Columbia. There he taught civil engineering from 1893 to 1916, becoming professor emeritus in that year.

Over a period of nearly 40 years Professor Burr was called upon frequently for service on governmental boards and commissions, the first important assignment being his appointment by the President in 1904 to membership on a board to study the possibility of bridging the Hudson River at New York. Subsequently he served on both the first and second Isthmian Canal Commissions and then on the board of consulting engineers on the Isthmian Canal.

In the same period he served as consulting engineer to several departments of New York City. One of his most important engagements was as a member of the board of three appointed in 1902 to study and report upon additional sources of supply for New York City, the other members being the late Rudolph Hering and John R. Freeman. That board recommended construction of the present Catskill Aqueduct System.

More recently Professor Burr had served as consultant to the Board of Water Supply of New York, and to the New York State Transit Commission, as consultant on the Holland Tunnel, and as consultant to the Port of New York Authority.

Professor Burr was the author of several books on engineering subjects.

Personals

H. P. FARROW, for many years a consulting engineer in Rockland, Me., has retired from active practice.

JOHN J. QUINN, Bedford, Ind., was elected President of the Indiana Highway Contractors, Inc., on Dec. 12 at the annual convention of that organization.

JAMES SOMERS, deputy surveyor of Lawrence County, Ohio, has been elected president of the newly organized registered professional engineers and surveyors of that county.

A. S. LANGSDORF, dean of the school of engineering and architecture, Washington University, St. Louis, has been elected president of the Missouri Academy of Science.

EARL L. COPE, consulting structural engineer of San Francisco, and past president of the Structural Engineers Association of Northern California, has been appointed

superintendent of the Bureau of Building Inspection, San Francisco, Calif.

G. S. ELDRIDGE, consulting engineer, Vancouver, B. C., has been named president of the Association of Professional Engineers of British Columbia, at the annual meeting of that organization.

RAY E. LAWRENCE, assistant PWA engineer for Kansas, on leave from his position of professor of sanitary engineering at the state university, has been named state PWA engineer, following the resignation of Robert Paulette.

JAY DOWNER, for many years chief engineer of the Westchester Park Commission, New York, and widely known as the developer of the county parkway system, has resigned. He stated that lack of construction work at the present time prompted his resignation.

F. A. DALE has been appointed assistant construction engineer on the Norris Dam project of the TVA. Mr. Dale was formerly engineer in charge of construction of the Hamilton Dam project on the Colorado River in Texas, with headquarters in Austin.

E. L. SCHMIDT has been named project engineer by the Allegheny County Authority, and GEORGE RICHARDSON has been named bridge engineer by the same body. Both Mr. Schmidt and Mr. Richardson have been serving in the engineering organization of the county.

HERBERT S. WALTERS, contractor and banker of Morristown, has been appointed state highway commissioner of Tennessee, to succeed Frank W. Webster, who resigned several weeks ago to accept a position with the TVA. Mr. Walters has been in the general contracting business in Tennessee for many years.

O. F. GOETZ, who has been serving temporarily as acting commissioner of the Tennessee Department of Highways, will be retained as chief engineer and assistant commissioner, according to an announcement of the newly appointed commissioner, Herbert Walters. Mr. Goetz has been in the department since 1917, being named office engineer in 1925, assistant engineer in charge of traffic in 1928, and chief engineer and assistant commissioner in 1933.

EDWARD T. TAYLOR, New Haven, Conn., has been named chairman of the Connecticut Public Utilities Commission. He has been a member of the commission for several years and previously served the New York, New Haven & Hartford R.R., in many engineering capacities, including assistant engineer of maintenance-of-way, contract engineer, and assistant to the vice-president.

CONSTRUCTION STATISTICS OF THE WEEK

HIGH private awards raise this week's engineering construction total to $29,180,000. Private work totals $13,991,000, the highest since Mar. 8. Federal awards at $4,831,000 are higher than last week but under the average week to date, while state and municipal awards at $10,358,000 are less than half of last week's volume and under the average week to date.

Waterworks awards at $991,000 returned to normal after the high volume last week, sewerage at $1,236,000, and public buildings awards at $3,022,000 are about the same as last week, commercial buildings at $1,100,000 are below a week ago, earthwork, irrigation, drainage and waterways at $4,095,000 is almost a 300 per cent increase over last week, while streets and roads at $4,554,000 represents a 23 per cent drop. Industrial buildings at $12,828,000 is the high record for the year.

The larger awards include steel for plant addition for American Sheet and Tin Plate Co., Gary, Ind., $1,000,000; cold finishing steel mill and hot strip steel mill, Ford Motor Co., River Rouge, Mich., $9,560,000; power house and service connections at Reformatory, Elmira, N. Y., $565,000; highways by Indiana, $451,000; cast iron water mains and high pressure main for fire protection, Buffalo, N. Y., $403,000; preliminary treatment tank at sewage disposal plant, reinforced concrete sewers, regulating chambers, etc., Columbus, Ohio, $371,000; 20,000 tons steel sheet piling for cofferdam at Grand Coulee Dam, Wash., $1,250,000; and Dam No. 16, Mississippi River, Muscatine, Iowa, $2,053,000.

New capital for the week reflects a continued active bond market with sales for construction financing totalling $5,902,000. Corporate financing for new plant construction totalled $500,000. PWA allotments outstanding made a net gain of $2,764,000 for public work, $1,670,000 for housing and an RFC loan to Metropolitan Water District totalled $12,096,000, making the addition to new capital for the week, $22,932,000.

CONTRACTS

(Thousands of Dollars)

	Weekly Average Dec. 1933	Prev. 4 Weeks	Week Dec. 20 1934
Federal Government	$5,132	$7,118	$4,831
State and municipal	12,241	16,581	10,358
Total public	$17,349	$23,699	$15,189
Total private	8,267	3,483	13,991
Week's total	$25,641	$27,182	$29,180
Cumulative to date: 1933	$1,052,341	1934	$1,261,720

NEW PRODUCTIVE CAPITAL

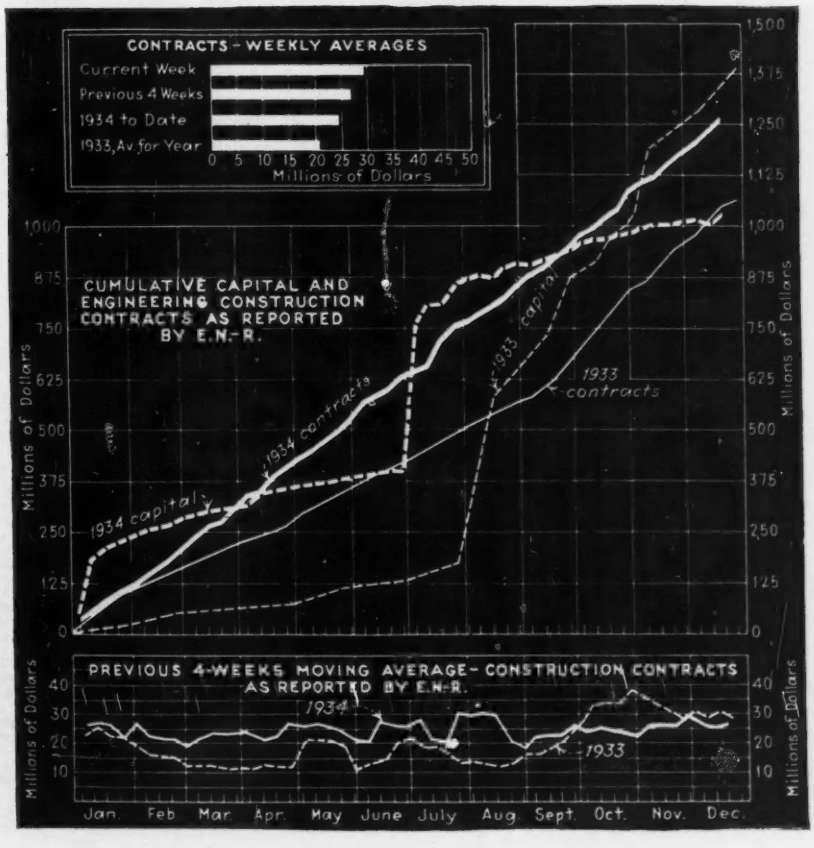
(Thousands of Dollars)

1934	Week Dec. 20	Cumulative
State and municipal	$5,902	$337,641
PWA allotments, S&M.	2,764	580,023
RFC loans, S&M	12,096	35,236
Corpoate issues	500	22,360
PWA allotments, private	1,670	55,148
Total, Non-Federal	$22,932	$1,033,408
PWA allotments, Federal Constr.	100	193,959
Total new capital	$23,032	$1,227,367
Cumulative to date: 1933	$1,399,396	1934	$1,033,408

Note: These figures include private bonds, and stocks sold for productive purposes; state and municipal bonds for construction; PWA loans and grants to states and municipalities, including the special highway funds; PWA private loans, and allotments for Federal construction.

INDEX NUMBER

E.N.-R.- Cost	1913 = 100	1926 = 100	E.N.-R.- Volume	1913 = 100	1926 = 100
Dec., 1934	201.86	97.03	Nov., 1934	115	50
Nov., 1934	201.36	96.76	Oct., 1934	98	44
Dec., 1933	192.14	92.36	Nov., 1933	133	58
1933 (Av.)	170.48	81.60	1933 (Av.)	102	45
1932 (Av.)	156.97	75.45	1932 (Av.)	127	56
1931 (Av.)	181.35	87.17	1931 (Av.)	220	96.5



Current Construction Unit Prices

Dam No. 6, Upper Mississippi River

CONTRACT was awarded in October, 1934, by the U. S. District Engineer, St. Paul, for the construction of Dam No. 6 on the upper Mississippi River near Trempealeau, Wisc. Ten bids were received, ranging from $1,668,442 (low and contract) to $2,473,286. Spencer, White & Prentis, New York City, was low. This firm was already on the site as contractor on the locks, awarded a year ago. The dam will be of the roller gate type, similar to that recently completed at Rock Island, Ill., with five roller gates with individual operating houses and equipment.

Following are the principal unit prices of the three low bidders, with minor items eliminated. (A)—Spencer, White & Prentis, New York, contract, $1,668,442; (B)—United Const. Co., Winona, Minn., $1,818,300: (C)—McCarthy Improvement Co., Davenport, Ia., $1,826,598.

UNIT PRICES OF PRINCIPAL ITEMS, DAM NO. 6, MISSISSIPPI RIVER

Item and Quantity	Unit Prices A	B	C
Cofferdam, movable gate section—948 l.f.	$188.00	$187.83	$276.50
Cofferdam, concrete spillway sect.—1,074 l.f.	10.00	1.34	17.50
Excavation, common—66,688 cu. yd.	.30	.417	.25
Excavation, dredged—393,830 cu. yd.	.18	.182	.22
Excavation, top soil—56,500 cu. yd.	.30	.309	.31
Clearing—22 acres	50.00	55.74	110.00
Fill—1,300 cu. yd.	1.50	.384	.45
Dike embankment—234,300 cu. yd.	.09	.282	.20
Timber piles, round vertical—135,136 l.f.	.60	.60	.60
Timber piles, round batter—15,392 l.f.	.80	.90	1.00
Concrete piles—1,680 l.f.	4.00	2.65	2.50
Steel sheet piles—95,000 s.f.	1.30	1.37	1.35
Pile load tests—10	300.00	576.55	300.00
Douglas fir timber—8,096 M.f.b.m.	150.00	209.04	110.00
Stone, derrick protection—9,239 cu. yd.	5.00	4.36	3.00
Riprap—6,550 cu. yd.	4.00	3.06	2.20
Gravel, embankment protection—1,520 cu. yd.	4.00	3.46	2.00
Concrete—37,748 cu. yd. (av. unit)	12.37	13.38	13.17
Structural steel—1,945,181 lb.	.057	.067	.062
Reinforcing steel—587,000 lb.	.05	.049	.05
Non-corrosion steel—9,260 lb.	.60	.745	.51
Nickel steel—6,190 lb.	.10	.139	.10
Forgings, steel and alloy—122,981 lb. (av.)	.088	.11	.083
Steel castings—69,810 lb.	.117	.156	.125
Alloy and iron castings—2,315 lb. (av.)	.17	.22	.16
Misc. bronze and copper—5,696 lbs.	.37	.49	.35
W. I. black pipe, std. wt., 1¼-6 in.—463 l.f.	1.10	1.18	1.47
Conduit, rigid metal, ¾-3 in.—2,054 l.f.	.83	.94	1.09
Electric grounding system (lump sum)	250.00	348.40	200.00
Crane track, 80-lb. rail—1,078 trk. ft.	2.35	3.28	2.35
Yard track, 49.7-lb.—207 trk. ft.	1.00	1.78	1.96
Handrailing, steel pipe—1,235 l.f.	1.80	2.62	1.60
Rubber seals, moulded—2,360 l.f.	.73	1.02	.73
Steel floor grating—2,966 sq. ft.	.77	.77	1.07
Roller gate, incldg. metal substructure—5	39,000.00	40,057.00	39,305.00
Electric heaters, roller gate—5	2,322.00	3,236.00	2,360.00
Roller gate operating machinery, incldg. hoisting chain, elect. equipment—5	17,550.00	20,458.00	18,400.00
Roller gate and m'ch'y. spare parts (lump sum)	7,055.00	9,832.00	7,910.00
Operating houses complete—5	4,000.00	3,861.00	5,580.00
Operating machine, tainter gate, incldg. elect. equipment—10	5,356.00	6,464.00	5,526.00
Tainter gates' spare parts (lump sum)	2,370.00	3,303.00	2,674.00
Bulkheads—roller gates (lump sum)	15,815.00	17,040.00	15,867.00
Install locomotive crane on service bridge	1,000.00	1,394.00	1,500.00
Install flat car on service bridge	200.00	348.00	175.00
Install 13 bulkhead storage trucks in yd. (lump)	130.00	272.00	100.00

Tygart Reservoir Dam, West Virginia

BIDS were opened Oct. 16, 1934, by the U. S. District Engineer, Pittsburgh, for the construction of the new Tygart River reservoir dam, located 2.2 miles above Grafton, W. Va. The dam, of the massive concrete straight gravity type, will have a crest length of approximately 1,850 ft. and a maximum height of 235 ft. The spillway section will be 490 ft. long and its crest will be 23 ft. lower than the non-overflow section of the dam. The site is accessible by a secondary improved highway in fair condition only, on the right bank from Grafton to Park View, and from thence about ¼ mile over a dirt road. The Baltimore and Ohio R.R. also passes on the right bank and is so situated that sidings can be installed for yard layout.

The U. S. furnishes f.o.b. Park View, W. Va., all cement, slide gates, ring follower gates, needle valves, gate hoists, motors, pumps for gate operation, culvert linings, trash rack frames and bars (except trash rack bars of top screen), lamp posts and fixtures, all piping and fittings for connecting the valves and valve operating mechanism, and steel sheet piling.

The project is to be completed within 1,080 calendar days. Two cofferdams will close the river, with only one cofferdam to be constructed at one time. The work on the second is to be restricted so as to provide a safe river discharge of a minimum 25,000 sec.ft. until the diversion works are functioning. Excavation material may be disposed of on 135 acres, adjoining the dam site on both sides. About 40 per cent of the entire excavated material is to be rehandled and paid for as backfill. PWA minimum wage rates prevail: $1.10 for skilled labor; 65c. for semi-skilled; and 45c. for unskilled. Maj. W. D. Styer is District Engineer.

Following is a tabulation of the quantities, unit prices, and totals for the three lowest bids of the five submitted.

TYGART RIVER RESERVOIR DAM, GRAFTON, W. VA.

Bidder	Total Bid
A—Frederick Snare Corp., New York	$6,305,773
B—Interior Const. Co., Minneapolis	7,474,937
C—Arundel Corp., Baltimore and John F. Casey Co., Pittsburgh	7,943,112

Item and Quantities	Unit Prices A	B	C
Cofferdam, enclosed—556 l.f.	$660.00	$500.00	$450.00
Excavation, common—274,160 cu. yd.	1.60	.60	.75
Rock channeling—20,000 sq. ft.	.70	1.10	.70
Excavation, fdt. preparation—16,300 cu. yd.	.80	5.00	3.50
Rock excavation—68,000 cu. yd.	2.35	2.63	2.50
Drill grout holes, 2 in. under 25 ft.—234,100 l.f.	.50	.60	.40
Drill grout holes, 2 in., over 25 ft.—1000 l.f.	1.00	3.00	1.60
Drilling 18 in. deep, 3½ in.—10,000 l.f.	.50	.40	.50
Drill rock coreholes, 3 in.—300 l.f.	2.50	3.50	3.40
Drill shot drilled conc. cores, 6 in.—1,800 l.f.	4.50	7.50	4.50
Drill shaft exploring holes, 30 in.—200 l.f.	25.00	50.00	40.00
Drill bolt holes, set bolts, 1 in.—5001.f.	2.00	1.00	.75
Hunt process treatment—150,000 sq. ft.	.04	.015	.02
Pressure grouting (cmt. by U. S.)—6,000 bbl.	4.00	4.30	4.80
Fill, incldg. backfill—136,930 cu. yd.	.20	.53	.40
Clay fill, impervious—750 cy. yd.	3.00	2.00	3.00
Piling, steel sheet (material by U. S.)—8,000 s.f.	.30	.50	.20
Derrick stone—3,100 cu. yd.	4.50	6.00	4.00
Stone riprap—1,760 cu. yd.	4.00	3.50	3.50
Concrete in dam—1,100,000 cu. yd.	4.18	5.30	5.85
Concrete, bldgs. and roads—10,380 cu. yd.	5.15	10.80	14.00
Concrete, trash racks—1,075 cu. yd.	20.00	31.00	35.00
Concrete, diversion tunnels—2,280 cu. yd.	7.00	13.00	15.00
Struct. steel—115,000 lbs.	.08	.08	.05
Struct. steel (material by U. S.)—300,000 lb.	.02	.03	.013
Steel reinforcing—3,500,000 lb.	.035	.043	.05
Safety treads—1,800 s.f.	2.00	2.00	1.60
Iron castings (material by U. S.)—190,000 lbs.	.02	.03	.01
Gratings—5,500 lbs.	.02	.15	.18
Copper strips, contract. jts.—24,300 l.f.	.35	.60	.53
Pipe, std. steel, 2-in. dia., deformat. gage—25,000 lbs.	.06	.11	.10
Pipe, std. steel, 3-in.—956,000 lbs.	.05	.08	.05
Pipe, std. steel, 6-in. drains—25,000 lbs.	.10	.09	.07
Pipe, std. steel galv., ½-in.—81,500 lbs.	.20	.23	.20
Same as above for 1½-in.—70,850 lbs.	.10	.15	.13
Pipe, E. S. steel galv. contract. jts.—7,400 lbs.	.12	.20	.15
Pipe, grout conduit box, lock nuts—10,270 lbs.	.20	.45	.30
Pipe fittings galv., ½-in. tees—3,360 lbs.	.25	.50	.50
Pipe fittings galv., ½ x ½ x 1½-in. tees—2,720 lbs.	.30	.35	.40
Pipe fittings, ½-in. cap—112 lbs.	.25	.50	.65
Pipe fittings, 1½-in. union galv.—4,000 lbs.	.20	.60	.60
Pipe fittings, 1½-in. cap galv.—185 lbs.	.20	.40	.40
Pipe fittings, ½-inch. ells, 45, 90 deg.—50 lbs.	.30	.60	.65
Pipe fittings, galv. street ells, ½-in. 45 deg.—1401 lb.	.40	.50	.80
Pipe, E. S. steel, 24-in.—26,350 lb.	.25	.14	.12
Valves, gate, 24 in.—18,400 lb.	.75	.46	.18
Pipe fittings, 24-in. ell—2,180 lb.	.40	.15	.20
Pipe fittings, 24-in. tee—2,600 lb.	.40	.15	.20
Pipe handrailing, 1½-in. galv., fittings—2,800 lb	.20	.25	.40
Concrete drains, porous, 4-in.—6,300 l.f.	.50	.35	.30
Concrete drains, porous, 12-in.—740 l.f.	1.50	1.90	1.75
Drain tile, vitrified, 24-in. ¾ tile D. S.—5,600 l.f.	1.60	2.40	2.00
Pipe, std. steel, 12-in.—7,800 lb.	.10	.08	.08
Slide gates, high pressure hydro., hoists, vents, piping, oil pumps, painted—1,300,000 lb.	.03	.02	.013
Steel culverts for above—1,465,000 lbs.	.03	.02	.006
Needle valve control mechan. 72-in.—203,000 lb.	.03	.02	.01
Follower slide gage, 2-ring, hoists, piping, by pass, vents.—220,000 lb.	.03	.02	.01
Steel culvert for 72-in. needle valve ptd.—165,000 lb.	.03	.03	.006
Pier structure hdw. piping, drains, sills, frames, metal work—(lump sum)	4,000.00	4,000.00	4,000.00
Office—(lump sum)	850.00	610.00	1,500.00
Fence, install, remove—8,000 l.f.	2.00	.40	.40
Roofing, blt. up felt, pitch—12 sq.	14.00	30.00	20.00
Flag poles—2	188.00	400.00	150.00
Lighting system—(lump sum)	6,602.00	14,000.00	22,000.00
Expansion joint, 4 to 18 in. x ¾-in.—25,000 l.f.	.104	.124	.07

CONSTRUCTION REPORTS

WATERWORKS

PROPOSED WORK

Calif., Patterson—Stanislaus County and Patterson Water Co. plan dam and bridge over San Joaquin River. $20,000. G. Macomber, Court House, Modesto, engr.

Calif., San Francisco—City and San Francisco Co., P. Utilities Comn., City Hall, rejected bids constructing Tunnel No. 1-B, of Lower Cherry Aqueduct under Hetch Hechy Water Supply Contr. 151, involving 2,910 ft. tunnel replacing and existing wood flume, 6,900 cu.yd. tunnel excav., 5 MFBM permanent timbering and 200 cu.yd. concrete lining in tunnel, etc. Will be readvertised.

Colo., Leadville—Twin Lakes Reservoir & Canal Co., Ordway, owners, Reconstruction Finance Corp. has authorized refinancing of first loan of $1,125,000 to include $675,000 for second tunnel, $250,000 to complete present tunnel and $200,000 to line present tunnel. Noted Dec. 6.

Conn., Cromwell—Cromwell Water Co., preliminary plans waterworks, incl. test borings at Nooks Pond Dam and new well system of supply to supplant present system of 5 small ponds. $20,000. W. J. Scott, State Dpt. Health.

Ia., Adel—City preliminary plans sinking several new wells for water supply.

Ia., Council Bluffs—City plans water softening plant. S. L. Etyne, 14 Pearl St., supt.

Ia., Dallas Center—City voted $41,500 bonds, waterworks and distribution system. Lafe Higgins, Hubbell Bldg., Des Moines, engrs.

Mich., Big Rapids—City retained Pate, Hamann & Hirn, 1610 Washington Blvd. Bldg., Detroit, to prepare plans for water filtration plant complete together with connections to system and appurtenances. To exceed $25,000.

N. Y., Batavia—City, rejected bids Nov. 14, improving waterworks. Will readvertise. Noted Nov. 1.

N. Y., Ogdensburg—City plans replacing 5,240 ft. watermains and 3,493 ft. sewers. $50,000. Part of work with F.E.R.A. funds.

O., Cincinnati—Hamilton Co. soon takes bids 500,000 gal. brick, stone, concrete water tank, 114 ft. high, 60 ft. diam., $100,000. J. S. Raffety, county sanitary engr.

O., Clyde—City plans reservoir. Funds will be transferred from $56,000 surplus in municipal light fund for project. Est. $20,000. Voters rejected bond issue of $200,000 on Nov. 6. Noted Nov. 29.

O., Gnadenhutten—Village plans waterworks system, incl. drilling wells, pumphouse northeast of city, and erecting standpipe on Stockers Hill south of town. Bids will be asked on 450,000 gal. steel standpipe of 450,000 gal. reservoir. $49,000. P.W.A. project.

O., McComb—City plans water system, elevated tank, steel, 100,000 gal. capacity, wells, pumps, distributing lines, 29 hydrants, 36 valves and 200 meters. P.W.A. Docket 7440. $61,300. H. P. Jones & Co., 2012 Toledo Trust Bldg., Toledo, engrs. Noted Apr. 19.

O., Martins Ferry—F. Wood, service dir., making plans wells, 1,500,000 g.p.d. capacity pumping unit. $20,000. P. E. Loftus, Oliver Bldg., Pittsburgh, Pa., engr.

O., Springfield—R. E. Price, supt. Waterworks Dpt., making plans extensions to present waterworks system, softening and filtration plant, 8,000 ft. 42 or 48 in. conduit. $1,400,000. P.W.A. project. W. Lucks, City Hall, engr. Noted Dec. 13.

O., Stryker — Village, H. E. Kelm, mayor, plans waterworks system, elevated steel tank, distributing system extensions, $64,000. P.W.A. project. G. Champ & Associates, 1025 Nicholas Bldg., Toledo, engrs.

S. D., Willow Lake — Municipality plans waterworks and sewage disposal projects. $50,000. Dakota Eng. Co., Western Bldg., Mitchell, engrs.

Tex., Burnet — City, c/o W. C. Galloway, mayor, plans approved by P.W.A. authorized to advertise for bids immediately, for waterworks system, incl. pumping plant, with dynamo, electrically driven, etc. 22,000 ft. distributing c.i. pipe, steel elevated tank, deep water well, $46,000. P.W.A. project. J. W. Beretta Engineers, Inc., Natl. Bank Commerce Bldg., San Antonio, engrs. Noted Aug. 9.

Tex., Crystal City—City waterworks improvements. $20,000. P.W.A. allotment rescinded. A. P. Hancock, Kerrville, engr. Noted July 12.

Tex., Houston—City, c/o O. F. Holcombe, mayor, waterworks improvements. P.W.A. allotment of $2,502,000 rescinded. J. M. Nagle, dir. P. Wks. Noted June 28.

Tex., Lefors—City, c/o Secretary, election Dec. 24, $12,500, waterworks improvements.

Tex., Marion — City, c/o Secretary, plans waterworks. $44,000. P.W.A. allotment approved.

Tex., Poth—City, W. Eckel, mayor, soon takes bids waterworks improvements, incl. new deep well cased, 150 gpm pump with 2½ hp. engine, fire hydrants, 16,000 lin.ft. 4- to 8-in. c.i. pipe mains. $33,000 bonds voted. A. A. Ririe, 655 East Woodlawn Ave., San Antonio, engr. P.W.A. project. Noted Oct. 25.

Wis., Fox Point—City plans extending water system. $21,000. P.W.A. loan received. C. Whitney, Milwaukee, engr.

BIDS ASKED

Calif., Los Angeles—Jan. 7, by Bd. Directors Metropolitan Water Dist., 306 West 3rd St., constructing Big Morongo and San Andreas Siphons, in Riverside Co. and comprises about 1.86 mi. aqueduct construction between 5 and 7 mi. northwest of Garnet, alternate bids have been invited for constructing siphons of either 12 ft. 4 in. jointed concrete pipe, cast in place; 12 ft. precast concrete pipe or 12 ft. 8 in. welded steel pipe supported on concrte piers, Spec. 84; Schedule 18-J, construction of 2 circular jointed cast in place concrete siphons and appurtenant works between Stations 9289 plus 29 and 9625 plus 75, siphon diam. 12 ft. 4 in.; Schedule 18-K, constructing 2 precast concrete siphons and appurtenant works between stations as above, siphon diam. 12 ft.; Schedule 18-S, construction of 2 welded steel siphons and appurtenant works between stations as above, siphon diam. 12 ft. 8 in., total length of each 9,811 ft.

Calif., San Francisco—Jan. 8, by Public Utilities Comn., City Hall, constructing (raising) addition to existing dam, to increase capacity of Hetch Hetchy Reservor, addition will raise crest of dam by 85.5 ft. from elevation, 3,726.5 to elevation 3,812; (known as O'Shaughnessy Dam) and is located at west end of Hetch Hetchy Valley on Tuolumne River (region shown on U. S. Geological Survey map of Yosemite Quadrangle). $3,500,000 available. To be financed in part by Federal P.W.A. funds and will be subject to P.W.A. regulations. Noted Sept. 27.

Ill., McLeansboro—Jan. 21, by City, C. N. Sneed, mayor, constructing waterworks. $75,000. P.W.A. project. Warren & Van Praag, Milliken Bldg., Decatur, engrs.

†Ind., Marion—Jan. 8, by Vet. Bu., Arlington Bldg., Wash., D. C., redeveloping Deep Well 2.

Ia., Dallas Center—City bids about Jan. 15, waterworks system, incl. tank on tower, pumps and 2- to 6-in. c.i. mains. $40,000. L. Higgins, Hubbell Bldg., Des Moines, engr. Noted Dec. 20.

Mich., Detroit—Dec. 27, by C. I. Plageus, secy, Bd. Water Comrs., furnishing, installing steel shelving and cabinets for store room, machine shop and mechanical buildings Springwells Station, Dpt. of Water Supply. To be financed in part by P.W.A. Est. $2,500. P.W.A. G. H. Fenkell, 735 Randolph St., genl. mgr.

Mich., Detroit—Dec. 27, by C. J. Plagens, secy. Bd. Comrs., furnishing, delivering, erecting raw water sample pump and sump pump in shaft at stub end of raw water tunnel, $5,000; 36½ ft. x 28 ft., 30 ft. high drainage pump house, super-structure of two 29x14½x21 ft. sluice gate houses, structural steel frame work with curtain walls of hollow tile and salt glazed brick tile faced on the exterior with limestone, coagulation basin and mixing chamber facings to be limestone with hollow tile and brick backing 9½ in. thick and consisting of about 100 ft. 11 ft., 507 ft. of 9 ft. and 92 ft. of 3 ft. high facing, incl. parapet and surmounted with an ornamental iron railing, repairing unloading dock and ramp to be 15½ ft. long, 13 ft. wide, 15 ft. high, consisting of rein.-con. slab supported by 4 rein.-con. columns, $50,000; rough grading of Springwells Station grounds, incl. constructing new roads, building masonry sections of catch basins and laying of c.i. bell and spigot pipe drains on site at Warren Ave. and Detroit Terminal R.R., $30,000, foregoing work at Springwells Station. P.W.A. project. G. H. Fenkell, 735 Randolph St., genl. mgr. Water Supply.

Mich., Elberta — Dec. 28, by L. W. Stall, village clk., constructing test well and 2 developed wells, drilling 4 in. test well, 200 ft. deep, and two 8 in. final developed wells with casings and screens, collecting of samples and test pumping. P.W.A. project. Francis Eng. Co., 303-304 Eddy Bldg., Saginaw, engrs.

Mo., Bland—Dec. 28, by City, waterworks and distribution system. P.W.A. allotted $44,500. G. E. Wells, Inc., 420 Security Bldg., St. Louis, engrs. Noted Oct. 11.

Mo., St. Louis—Jan. 15, by Bd. P. Serv., City Hall, furnishing, delivering seven 12 in. pressure reducing regulating valves for St. Louis Water Dpt., $3,000; laying 12 in. c.i. watermain in various streets, $20,320.

N. Y., Buffalo—See "Contracts Awarded."

N. Y., Jamestown—See "Contracts Awarded."

N. Y., New York—Dec. 28, by M. P. Davidson, comr. Water Supply, Gas & Electricity, Municipal Bldg., repairing 12 in. submarine watermain between Rikers Island and Manida St., and 8 in. submarine watermain between City Island and Harts Island, Bronx Boro.

S. D., Rapid City—See "Contracts Awarded."

Tex., Marble Falls—Dec. 27 (extended date), by City, c/o C. M. Marrs, mayor, waterworks extension, incl. new mains, removing 4,000 ft. steel pipe and relaying new 8, 6, 2 and 1 in. pipe. $25,000. H. R. F. Helland, 1020 Frost Bank Bldg., San Antonio, engr. P.W.A. project. Noted Sept. 13.

Tex., Richmond — Dec. 28, by City, G. S. Birdwell, mayor, waterworks, incl. well, turbine pumps, pump house, service pump and motors, 50,000 gal. reservoir, water topping machine, c.i. pipe, valves, boxes, fire hydrants, meters and water tanks. $58,000. D. M. Duller, 2nd Natl. Bank Bldg., Houston, engr. Noted Apr. 5.

Tex., Streetman—Jan. 3, by City, c/o R. C. Cole, mayor, waterworks, incl. c.i. pipe, steel pipe, c.i. specials, gate valves, boxes, fire hydrants, copper service pipe, master meter, chlorinator, etc., incl. 8,720 ft. 4- to 8-in. c.i. pipe, 7,900 lin.ft. 2 in. galvanized steel pipe, 7,000 lb. c.i. specials, 20,000 yds. lake excav., one 150 gpm stand. pump, 1 pumping station and filtration plant complete, 1 master meter, 1 chlorinator, two 8 in., four 6 in. and 12 2 in. gate valves and boxes, 14 fire hydrants, 80 service connections, 1,000 lin.ft. ¾ in. copper service pipe, 1,000 lin.ft. ¾ in. galvanized steel service pipe. $36,000. P.W.A. project. H. R. F. Helland, 1020 Frost Bank Bldg., San Antonio, engrs.

CONTRACTS AWARDED

Calif., San Francisco—Public Utilities Comn., City Hall, laying University Mound Pipe Line, involving installation of 6,800 ft. 39 and 6,900 ft. 30 in. pipe, Sect. A, to M. J. Lynch, Oakdale and Barnevald Aves., $89,365; Sect. B, to Sibley Grading & Teaming Co., 165 Landers St., $133,494. P.W.A. Bids Dec. 5, awarded Dec. 11.

Ill., Highland—City constructing dam for water reservoir, to Stocker Gravel & Constr. Co., Highland. $17,415***filter plant improvements and equipment, to P. H. Wall Contr. Co., 4905 Delmar Blvd., St. Louis, Mo., $2,138. Bids Nov. 26. Noted Sept. 6.

Ind., Madison—City, waterworks, to A. D. Cook, Lawrenceburg, est. $12,500. Bids Nov. 30. Noted Nov. 22.

†La., Alexandria—Con. Q.M., Camp Beauregard, drilling well at Camp Beauregard, to L. A. Bevins, Glenmora, $2,580. Bids Oct. 22, awarded Dec. 10.

Mass., Weymouth—Town, Bd. Water Comrs., Town Hall, Contr. "B" furnishing, installing pumping plant, to Turbine Equipment Co., 80 Federal St., Boston, $16,900***Contr. "C", furnishing, installing filter equipment and piping, to Norwood Eng. Co., Florence, $34,500. P.W.A. Bids Oct. 22. Noted Oct. 11.

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Federal Government projects are classified under heading denoting type of work and designated by symbol of †

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Waterworks (Continued)

N. Y., Buffalo — City, c.i. watermains in Parkside Section and high pressure main for fire protection in Michigan-Perry Section, by day labor. $403,000. ERB project. G. J. Summers, comr. Dpt. P. Wks. Noted Nov. 29.

N. Y., Buffalo—Erie Co., improving water supply systems in parks, $6,520; purchasing materials for oiling and repairing county park roads, $7,500; tennis courts at Chestnut Ridge and Emery Parks, $2,500; comfort stations at Chestnut Ridge Park, $2,000, by day labor. Total $18,520. ERB project. Noted Nov. 8.

N. Y., Jamestown—Bd. P. Utilities, 2,000 ft. c.i. watermains in 5 streets, $8,714; landscaping and improving School Park, $9,533, by day labor under supervision of L. E. Graham, city engr. TERA project. Noted Nov. 8.

N. C., Spruce Pine—Town Council, reconstructing waterworks system, to Wannamaker & Wells, Spartanburg, S. C. Est. $63,000. P.W.A. Bids Nov. 15. Noted Nov. 14 Daily.

Okla., Alva—City, 500,000 gal. elevated tank, concrete foundation and excavation, to Chicago Bridge & Iron Wks., 37 Van Buren St., Chicago, Ill., $23,670; distribution lines, etc., to Asplund Constr. Co., Enid, $12,503. Bids Nov. 23. (**Correction**—Names and addresses of contractors.) Noted Dec. 6, under "Contracts Awarded."

S. D., Rapid City—E. Sneckenberger, city purch. agt., purchased 1 carload 6 in. c.i. pipe about 725 lin.ft., work will be done by day labor. $2,500. C. I. Leedy, city aud.

Tex., Abbott—City, L. A. Barnett, secy., constructing elevated water tank, to Chicago Bridge & Iron Co., 2919 Main St., Dallas, $3,280. Est. $3,500. P.W.A. Bids Dec. 5. Noted Nov. 29.

Tex., Kerens—City, H. Brister, mayor, waterworks improvements, incl. c.i. pipe, gate valves, pump house, centrifugal pumps, sedimentation basin, to E. L. Martin, North Texas Bldg., Dallas. Est. $65,000. P.W.A. Bids Sept. 28. Noted Sept. 20.

Tex., Lindale—City, M. H. York, mayor, complete water and sewerage system, elevated tank and tower distribution system, sewer collecting system, treatment plant, pumping equipment and pump house, to Central Constr. Co., Constr. Bldg., Dallas, $49,692. Est. $65,000. Bids Dec. 4, awarded Dec. 5. Noted Nov. 15.

Wis., Shawano—City, constructing 250,000 gal. semi-elliptical bottom steel tank on tower, to Pittsburgh-Des Moines Steel Co., 38 South Dearborn St., Chicago, Ill., $14,775. Bids Oct. 22. (**Correction**—name of city). Noted Nov. 22, under "Contracts Awarded."

Ont., Port Colbourne—M. Peart, town clk., 270 ft. 22 in. pipe for suction pipe line from well to pump house, with plain ends to be used with Dresser couplings, to National Iron Wks. Ltd., foot Cherry St., Toronto, $1,339 plus cost of couplings. Noted Nov. 1.

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SEWERAGE AND WASTE DISPOSAL

PROPOSED WORK

California and Mexico — Bd. Supervs. San Diego County, Calif., ordered County Surveyor E. R. Childs, to make survey and tentative plans for international sewer to drain a group of communities, incl. San Ysedro on the American side and Tia Juana, Old Tia Juana and Agua Caliente, on the Mexican side. Trunk lines to be built as an international undertaking, communities to construct own interior systems or connect those already built. The international portion will require 23,000 ft. 24 in. pipe, 3,800 ft. 15 in., 8,800 ft. 12 in., 60 manholes, a trussel crossing of the Tia Juana River and temporary outfall. $100,000. It is proposed the two governments join in the work and finance the project.

Calif., Los Angeles—Los Angeles Co., plans 23,835 ft. West Altadena Storm Drain, Inc., 18,057 ft. 24- to 69-in. and 2,712 ft. 12- to 21-in. rein.con. pipe, etc., $848,675; 15,767 ft. Lomita Storm Drain, 16,489 ft. centrifugally spun rein.-con. pipe, etc., $848,675; 8,325 ft. City Terrace Storm Drain, $496,836. Application made to S.E.R.A. for labor and materials. C. E. Arnold, 7th Floor, Hall of Records Bldg., engr.

Conn., Windsor — Town revising plans for Stony Hill sewer layout, incl. sewers in Wilton, Park and Laurel Aves., Plymouth St., Harvey, Hillcrest and Ludlow Rds. and trunkline to the section. To exceed $25,000. C. Saville, 1026 Main St., engr. Noted May 3.

Minn., Faribault — City, field survey being made for sewage disposal plant. I. Smith, city engr. Buell & Winter Eng. Co., 503 Insurance Exch., Sioux City, Ia., consult. engrs. for survey.

Mo., Shrewsbury—City, E. C. Jenkins, city clk., 7423 Lansdowne Ave., bids in January or February, complete system trunk line sanitary sewers and laterals with provisions for handling storm water at some main points to connect at 2 or 3 outlet points with River Des Peres Drainage Wks., incl. 20,800 ft. sewers to connect with St. Louis Sewer and 46,000 ft. lateral connecting sewers. $107,000. P.W.A. project. R. Horton, 650A East Big Bend Blvd., Webster Groves, engr. Noted Dec. 6.

Neb., Columbus—City made plans sewage disposal plant. Plans to be submitted to State Health Dpt. P.W.A. project. E. J. Christensen, Columbus, engr.

O., Alliance—Stark Co. plans new sewage disposal plant at Fairmount Childrens Home, near here. $25,000. FERA project. G. M. Davidson, Canton, engr.

O., Cincinnati—City, J. E. Root, dir. P. Wks., making plans revamping present work house incinerator and enlarging same. Bates Ave. $100,000. Fosdick & Hilmer, Cincinnati, engrs.

O., Reynoldsburg—Village withdrew application for $45,000 P.W.A. funds for sewerage system, Jennings-Lawrence Co., 12 North 3rd St., Columbus, engrs.

Ont., Ingersoll—W. R. Smith, preparing plans complete sewerage system, for City Council.

Ont., Milton—Town making plans new sewerage system and takes bids early in 1935. G. H. Power, Oakville, engr.

Pa., Oil City—City making plans Oil Creek interceptor sewerage system. To exceed $25,000. B. B. Weber, city engr. **Maturity early in 1935.**

S. D., Willow Lake—See "Waterworks."

Tex., Austin—City, J. G. Morgan, mgr., plans nearing completion furnishing, installing mechanical equipment for sewage treatment plant, $100,000. J. E. Motheral, city engr.; 18 in. c.i. sanitary sewer for Shoal Creek Sewer line $90,000; making plans 6- to 10-in. vit. tile lateral sewer extension in West Austin, $90,000. P.W.A. project. Hawley, Freese & Nichols, Capps Bldg., Fort Worth, consult. engr. on all projects.

BIDS ASKED

Ala., Birmingham—Jan. 8, by City Comn., storm sewers and appurtenances on Sect. 3, Ensley Dist., involving 17,500 cu.yd. earth, and 10,700 cu.yd. rock excav., brick sewer pipe, bends, manholes, 30 inlets, etc. J. D. Webb, city engr.

Calif., Burlingame—Jan. 7, by City Council, constructing sewage disposal plant on San Francisco Bay, located about ¼ mi. from shore line. $86,000 bonds voted to finance. P.W.A. project. C. M. Thomas, city engr. Noted Sept. 13.

Ill., Aurora—Feb. 6, by Aurora Sanitary Dist., R. J. Wing, Keystone Bldg., sewers. $133,000. P.W.A. project. W. Deuchler, city engr.

Ill., Chicago—Dec. 27, by J. J. Sullivan, clk. Sanitary Dist. of Chicago, 910 South Michigan Ave., constructing Southwest Side Intercepting Sewer, Contr. 2; also furnishing, delivering steam turbine blower units, Div. B., and steam turbine driven pumping units, Div. C, for Southwest Sewage Treatment Wks.

Mo., Bland—Dec. 28, by City, sanitary sewerage system. $25,500 allotted by P.W.A. G. E. Wells, Inc., 420 Security Bldg., St. Louis, engrs.

N. J., Jamestown—See "Contracts Awarded."

N. Y., Belmont—See "Contracts Awarded."

N. Y., Brooklyn—Dec. 27, by R. V. Ingersoll, pres. Brooklyn Boro, Boro Hall, storm and sanitary sewers in Stillwell, Bath and 28th Aves., Avenue U, West 11th and West 13th Sts., and sanitary sewer within pumping plant grounds, from point in West 11th St., about 200 ft. south of Avenue V to pump well and a 30 in. force main in Avenue V, etc.

N. Y., Niagara Falls — See "Contracts Awarded."

O., St. Clairsville—See "Contracts Awarded."

Mass., Boston—Dec. 26, by City, Dpt. P. Wks., C. J. Carven, comr., Dpt. P. Wks., City Hall Annex, constructing Dorchester Brook Sewer between Dudley and Quincy Sts., Dorchester. P.W.A. project. To exceed $25,000.

CONTRACTS AWARDED

Calif., San Francisco—S. J. Hester, secy. Dpt. P. Wks., sewer in Merced Lands, near Lake Merced, to MacDonald & Kahn Co., Financial Center Bldg., $51,190. Est. $68,000. P.W.A. Bids Nov. 21, awarded Dec. 7.

Conn., New Haven—City, constructing 975 ft. each of sanitary and storm sewers. $19,400. Owner builds, FERA labor. E. Nettleton, City Hall, engr. Noted Dec. 13.

Ill., Carthage—City, 475 bbl. portland cement, to Lyon & Hanan Lumber Co., Carthage, $1,173•••475 bbl., to Alexander Lumber Co., Carthage, $1,173•••65,000 lb. reinforcing steel and wire fabric, to P. Vredenburgh Lumber Co., Springfield, $1,724 and $108 respectively •••miscellaneous steel and wrought iron, to Illinois Steel Bridge Co., Jacksonville, $464••• subway grating, to Gierhe-Robinson Co., 332 West 4th St., Davenport, Ia., $230•••sewage flow water meter, to Simplex Valve & Meter Co., $370•••4 in. vertical sewage pumps with motors, to Chicago Pump Co., 2336 West Wolfram St., Chicago, $904•••filter underdrains, to W. S. Dickey Clay Mfg. Co., Macomb, $892. Grand total $7,038. Bids Nov. 20.

Ill., Red Bud—City, 30,500 ft. 8- to 15-in. sewerage system and sewage disposal plant, to P. H. Wall Contg. Co., 4905 Delmar Blvd., $51,800, using machine labor. P.W.A. Bids Dec. 7.

Ia., Cedar Rapids—City Council, constructing J Sewerage System, to Stark Constr. Co., Cedar Rapids, $83,087. Est. $74,697. P.W.A. Bids Dec. 10. Noted Dec. 5.

†**Md., Annapolis**—Yards & Docks, Navy Dpt., Wash., D. C., sewers and drains, incl. motor driven pump at U. S. Naval Academy, to Boudin Contg. Co., 225 East 21st St., New York, N. Y., $95,540. Est. $100,000. Bids Nov. 7. Noted Oct. 25.

†**Md., Beltsville**—Dpt. Agriculture, Purchase, Sales & Traffic, Wash., D. C., sewerage system, to D. Catalano & Sons, Baltimore, $19,232; sewage treatment works, to Continental Constr. Co., Fort Dodge, Ia., $66,884. Bids Oct. 30, awarded in November. Noted Oct. 18.

Miss., Grenada—See "Streets and Roads."

N. Y., Belmont—Allegany Co., drainage sewer system in Norton, Martin, and Tracy Aves., Belmont, $16,000 or more; 3,500 ft. 8 and 10 in. sanitary sewerage system in Farnum and Putzman Sts., Wellsville, $8,900; improving Cemetery Rd. between Belmont and Friendship, $8,400, by day labor. Total est. $33,300. TERA project.

N. Y., Jamestown—City, constructing River St. sanitary sewer with 2 extensions, $16,800; 11th St. Storm sewer, $13,116; Harvard St. storm sewer, $9,760, by day labor, under supervision L. E. Graham, city engr. TERA project.

N. Y., Niagara Falls—City constructing 13 sewers in LaSalle Section and 1 in Pine Ave. area by day labor. ERB project. $85,685. $31,730 allotted for materials and equipment. W. D. Robbins, city mgr.

O., Cleveland — City, constructing Westerly Sewage Treatment Works, Contr. 84, to Hunkin-Conkey Constr. Co., 1742 East 12th St., $138,545. P.W.A. Bids Nov. 23. Noted Nov. 15.

O., Cleveland—City, conduit Nine Mill Creek to Doremic-Nero Constr. Co., 1424 Lakeview Rd., $93,938. P.W.A. Bids Nov. 15. Noted Nov. 22.

O., Columbus—City, W. J. Lucks, dir. preliminary treatment tank at sewage disposal plant, to Boyajohn & Barr, 299 South Front St., $266,898; 3,400 ft. 54 in. rein.-con. sewer, 3 regulating chambers, incl. 14,800 cu.yd. excav., to Kalill Co., 4160 West 105th St., $93,730. Bids Dec. 3 and Nov. 30.

O., St. Clairsville—Village, complete sewerage system, day labor. FERA project approved. Est. exceeds $25,000. Jennings & Lawrence, 12 North 3rd St., Columbus, engrs. Noted Oct. 18.

R. I., Pawtucket—City, Water & Sewer Dpt., City Hall, concrete storm sewer in Prave St., to I. Capaldi, 270 Mt. Pleasant Ave., Providence; concrete sanitary and storm sewer in Brook St., to Wm. A. Gammino, Inc., 250 Hartford Ave., Providence. Total est. exceeds $25,000. T. E. Harding, city engr. Awarded Dec. 10.

Tex., Lindale—See "Waterworks."

Wis., Milwaukee — Sewerage Comn., reconstructing filter room and furnishing, installing air filters for plant extension, to Kroening Eng. Corp., 4500 West Mitchell St., $20,761. P.W.A. Bids Dec. 6, awarded Dec. 13.

†*Federal Government.*

BRIDGES AND GRADE CROSSINGS

PROPOSED WORK

Calif., Patterson—See "Waterworks."

Colorado—City Council passed bill for appropriation of $15,000 for constructing bridges across Cherry Creek at Champa and Stout Sts. $35,000 already appropriated. Will call for bids for same in a few weeks. A. K. Vickery, City and County Bldg., Denver, engr. Noted Oct. 25.

Ky., Russell—City Council and Chesapeake & Ohio R.R. Co., C. W. Johns, ch. engr., Richmond, Va., plan 265 ft. long underpass for vehicular traffic with pedestrian sidewalks on both sides, Belfont St., $240,000; underpass on Main St., $20,000; underground walkway from C. & O. Depot on Ferry St. to Railroad St., $20,000. Project will be submitted to P.W.A. at Washington, D. C., by City with application for loan and grant for city's share of cost.

Me., Portland—City, City Manager, 389 Congress St., making plans 2,785 ft. rein.-con., granite bridge, 54 ft. wide to replace Washington Ave. Bridge on Route 1 in Back Bay Dist., known as Turkey's Bridge. To exceed $2,000,000. Lane & Alter, 64 Sherman St., Portland, engrs.

Massachusetts—Commonwealth of Massachusetts, Dpt. P. Wks., 100 Nashua St., Boston, preliminary plans bridge over Chelsea River between Boston and Chelsea. $800,000. F. E. Lyman, comr. A. W. Dean, ch. engr.

Mo., St. Louis—Bd. P. Serv., City Hall, soon takes bids rein.-con. bridge to carry River Des Peres Parkway over Watson Rd., in southwestern section of city. $46,000. P.W.A. project. W. C. E. Becker, city engr.

Mo., St. Louis—Bd. P. Service, City Hall, revised plans eliminating grade crossing of Oak Hill branch Missouri Pacific R.R. on Kingshighway Blvd. near Wilson Ave. $556,300. $134,900 P.W.A. funds allotted. City to pay $278,200 and railroad $166,900 towards cost.

North Carolina—State Hy. Dpt. & P. Wks., Raleigh, making plans 3 mi. creosoted timber bridge over Currituck Sound, at Kitty Hawk. $500,000. W. V. Baise, Raleigh, acting engr.

Pa., Oil City—Comrs. Venango Co., Franklin and Oil City, plans replacing White Bridge over Oil Creek, North Seneca and Center Sts. $40,000. **Maturity in 1935.** B. B. Weber, city engr.

Tex., Port Arthur—Jefferson Co. election Jan. 12, $1,500,000 for constructing steel, concrete bridge over Neches River, between Port Arthur and Beaumont, State of Texas and U. S. Government to share cost. A. P. Rollins, Port Arthur, engr. Noted Nov. 29.

BIDS ASKED

Illinois—Jan. 4, by State Dpt. P. Wks. & Buildings, Div. Hy., Springfield, constructing rein.-con. slab bridge on Route 138, Sect. 102BNRH, northeast of Keensburg; rein.-con. girder bridge on Route 138, Sect. 103B NRH, West of Mount Carmel, both Wabash Co. E. Lieberman, ch. hy. engr.

Kansas—See "Streets and Roads."

Pennsylvania—See "Streets and Roads."

Virginia—See "Streets and Roads."

Wisconsin—Dec. 28, by State Hy. Comn., Madison, culverts and bridges on Milwaukee-Chicago Rd., Kilbourn Relocation, Sect. 1, Contr. I, incl. 1,415 cu.yd. excav.; Power Mill Bridge on same road, Sect. II, Contr. I; bridges and culverts on same road, Sect. 3, Contr. I, all foregoing Kenosha Co.; bridge on Menomonie-Cedar Falls Rd., (Cedar Falls Bridge) Hy. BB, NRS 550-A, Dunn Co., incl. 780 cu.yd. excav.

CONTRACTS AWARDED

Illinois—State Dpt. P. Wks. & Buildings, Div. Hys., Springfield, widening rein.-con. slab bridge and 3 rein.-con. slab bridges in LaSalle Co., to E. M. Melahn Constr. Co., Algonquin, $18,692***bridge in Adams Co., to Triangle Constr. Co., Kankakee, $27,109***bridge in Sangamon Co., to Empire Contg. Co., Chicago, $57,453. Grand total $103,254. Bids Nov. 16.

Indiana—State Hy. Comn., Indianapolis, constructing overhead crossing at Hartsdale Junction, Pennsylvania R.R., Michigan Central R.R. and E.J.E. R.R., to T. McQueen, Forest Park, Ill., $144,411. Est. $196,365. Bids Nov. 20. Noted Nov. 15.

Iowa—State Hy. Comn., Ames, culverts in Appanoose Co., to G. Jordan & Son, Centerville, $14,018***bridges in Cherokee Co., to F. O. Montgomery, Sac City, $27,758***bridge and culvert in Fremont Co., to E. A. Wickham & Co., Council Bluffs, $11,117***bridge in Monroe Co., to F. H. Christensen Constr. Co., Albia, $4,988***bridges in O'Brien and Osceola Counties, to A. Olson Constr. Co., Waterloo, $25,979. Grand total $83,860. **P.W.A.** Bids Dec. 4, awarded Dec. 7. Noted Nov. 29.

Michigan—State Hy. Comn., Lansing, bridges in Roscommon Co., to W. Toebe & Co., Shingleton, $13,021***Allegan Co., to E. C. Nolan & Son, $47,812. **P.W.A.** Bids Nov. 23.

New Jersey—State Hy. Comn., Trenton, constructing bridge Morris Co., to G. M. Brewster, Bogota, $39,731. Bids Dec. 10. Noted Nov. 29.

†*Federal Government.*

Virginia—State Hy. Comn., Richmond, overhead bridge at Doswell, Hanover Co., to W. D. Dean, Richmond, $7,364***bridge over Crane Nest River, Wise Co., to Alley Constr. Co., Bristol, $11,833***bridge over Lowmans Ferry, Pulaski Co., to Alley Constr. Co., Bristol, $28,467. Grand total $47,664. Bids Dec. 4. Noted Nov. 22.

Wisconsin—See "Streets and Roads."

Wis., River Hills—Village, constructing bridge on Range Line Rd., to Kramp Constr. Co. Berlin. $68,115. **P.W.A.** Bids Dec. 4. Noted Nov. 22.

STREETS AND ROADS

BIDS ASKED

Arizona—Dec. 27, by State Hy. Comn., Phoenix, grading, draining, surfacing forest boundary about 28 mi. north of Flagstaff, and extending northerly to Cameron, about 10.66 mi., NRH 9501, Flagstaff-Fredonia Rd. T. S. O'Connell, state hy. engr.

California — Jan. 2, by State Hy. Comn., Sacramento, grading, bituminous treated crushed gravel or stone, road mixed surfacing 1.5 mi. hy. between Martell and Jackson, Amador Counties. C. H. Purcell, P. Wks. Bldg., Sacramento, engr.

Florida—Dec. 27, by State Road Dpt., Tallahassee, concrete paving 1.129 mi. Rd. 28, N.R.H. and M 72-C and N.R.M. 72-B, Flagler Co. $36,000. J. H. Dowling, state hy. engr.

Illinois—Dec. 28, by Dpt. P. Wks. & Buildings, Div. Hys., Springfield and Benton, curbing, guttering, paving 0.9108 mi. Sect. 1-CS and Sect. 11-WZ, Benton. G. H. Baker, engr. city streets and county roads.

Illinois—Jan. 4, by Dpt. P. Wks. & Buildings, Div. Hys., Springfield, bituminous filled brick on concrete paving 1.18 mi. Route 8, Sect. 10R, west of Peoria; 1.61 mi. Sect. 1-NRS, Peoria Airport Spur, Peoria Co.; concrete paving 0.08 mi. Route 22, Sect. 11S-4, Chicago Heights approaches to C. and E.I.R.R. and C.H.T.T. R.R. subway; 7.68 mi. Route 70A, Sect. 110, Seneca south; 7.97 mi. Route 70A, Sect. 111, Route 17, toward Seneca; 6.18 mi. Route 100, Sect. 109, Route 98, west of Havana, southwest to Marbletown, 6.82 mi. Route 100, Sect. 110, Marbletown southwest through Bluff City; 6.83 mi. Route 100, Sect. 111, Browning west of Bluff City; 4.82 mi. Route 119 A, Sect. 119, Route 4 west of County Line; 0.75 mi. Route 104, Sect. 109, from B. and O. R.R. on Main St., Morris City east to Route 1; 2.86 mi. Route SA7, Sect. 123 NRS, Route 49, at Bordton, toward Redman, Edgar Co.; 0.25 mi. approaches to Missouri Pacific R.R., Route 150, Sect. 133; guttering 5,365 ft. Route 54, Sect. 541X-1, North Ave., west of Elmwood Park, from 1st Ave. to Des Plaines River; graveling or crushed stone surfacing 4.24 mi. Route SA10, Sect. 6G-NRS, Route 2, at Wapella towards Waynesville, DeWitt Co.; 2.5 mi. Route SA6B, Sect. 13GNRS, Hamilton Co.; 3.29 mi. Route SA3, Sect. 8GNRS, Route 140, toward Elizabethtown, Hardin Co.; 3.08 mi. Route SA7, Sect. 8-G NRS, Nokomis North to county line, Montgomery Co.; 2.62 mi. SA2 and 8, 8G-NRS, Moultrie Co.; guttering 5,365 ft. North Ave. west of Elmwood Park from 1st Ave. to Des Plaines River. E. Liberman, ch. hy. engr.

Louisiana — Jan. 2, by State Hy. Comn., Baton Rouge, concrete paving 0.285 mi. Streets in Minden, Project 6950, Webster Parish; widening, surface treating 0.298 mi. streets in Newellton, Project 6350, Tensas Parish. P.W.A. project.

La., Shreveport—Jan. 10, by Caddo Parish Police Jury, graveling 6.431 mi. Gilliam-Scott Hy.; constructing gravel base on 7.102 mi. Colquitt Hy., P.W.A. project; double surface treating on gravel base paving 6.697 mi. North Lakeshore Hy.; 6.682 mi. Blanchard-Furrh Hy.; grading 5.214 mi. Colquitt Hy. J. H. Ellis, engr.

Massachusetts—Dec. 26, by Commonwealth of Massachusetts, Dpt. P. Wks., F. E. Lyman, comr., 100 Nashua St., Boston, stone and tar mixed in place surfacing 5.801 ft. P.W.A. project R-13, Docket 3618, Otis.

Mississippi—E. D. Kenna, dir. State Hy. Dpt., Jackson, rejected bids Dec. 4, reconstructing existing pavement on 0.287 mi. NRM 245-B, Greenwood, Le Flore Co., $6,000; grading, drainage structures 1.158 mi. Jackson-Gulfport Hy., NRH 160-C, Harrison Co., $17,000. P.W.A. project. Will readvertise. Noted Nov. 29.

Kansas—Dec. 28, by State Hy. Comn., at office of County Clerk, Concordia, sand gravel surfacing, earthwork, culverts, bridging, concrete paving roadside improvements 55.422 mi. hys. in Clay, Washington, Republic, Lincoln, Saline, Ellsworth, and Dickinson Counties; continuous steel, rein.-con. deck girder span bridge, Cloud Co.

Kansas—Dec. 29, by State Hy. Comn. at office of County Clerk, Concordia, earthwork, culverts, bridging, concrete paving, roadside improvement on 9.343 mi. hys. in Douglas, Johnson and Jackson Counties.

Maryland—State Roads Comn., Baltimore, rejected bids stabilized earth paving 0.87 mi. Contr. Wo-155-1-12 Federal Aid Project, Worcester Co. Noted Sept. 20, under "Contracts Awarded."

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Public-Works Question Slip

● To the Reader: Below is the list of questions mentioned in our appeal printed on page 802, asking you to cooperate in a significant survey by contributing your views and experience on the public-works campaign. Full and early response will be of greatest value.

Check and mail to Editor
Engineering News-Record
Room 2804, 330 West 42nd St.
New York, N. Y.

1. Should the public-works (PWA) campaign be continued? Yes ☐ No ☐
2. If not, what other measure for rapid re-employment and business stabilization would you recommend? .....
3. If so, should the campaign be primarily
   ☐ Relief?
   ☐ Recovery of normal business?
4. What fields offer the largest volume of useful projects for quick construction?
   ☐ Public federal ☐ Private utility
   ☐ Public non-federal ☐ Housing
   ☐ Private industrial ☐ Other building
5. Should the campaign be confined to projects self-liquidating through revenues or expense reduction? Yes ☐ No ☐
6. What types of projects are best?
   ☐ Roads and streets
   ☐ Schools and hospitals
   ☐ Waterworks ☐ City halls, etc.
   ☐ Housing ☐ Bridges
   ☐ Sewerage ☐ Post offices
   ☐ Parks ☐ Grade-crossings
   ☐ Flood control ☐ Private buildings
7. For speed, combined with soundness, which kind of control is better?

	Centralized	Decentralized
In authorizing projects	☐	☐
In approving bond contracts	☐	☐
In disbursing funds	☐	☐
In engineering control	☐	☐
In inspection	☐	☐

8. Further, would you recommend:
   ☐ Encouraging lease projects?
   ☐ Relaxed eligibility requirements?
   ☐ Relaxed security rules?
9. Should wages be required to follow:
   ☐ Codes? ☐ Local prevailing?
   ☐ Fixed minimum? ☐ Zone?
10. Should PWA wage rates be

	Common	Skilled
Raised?	☐	☐
Lowered?	☐	☐
Maintained?	☐	☐

11. Should hiring be left to local relief authorities?
    For common labor? Yes ☐ No ☐
    For skilled labor? Yes ☐ No ☐
12. From your knowledge of your locality has the past year's PWA campaign exhausted:
    Eligible non-federal projects? Yes ☐ No ☐
    All desirable projects? Yes ☐ No ☐
13. Should force-account work be:
    Unrestricted? ☐ Restricted? ☐
    Prohibited? ☐
14. Should force-account work be subject to the same wage, hour and purchase restrictions as contract work? Yes ☐ No ☐

What is your present position or kind of activity? .....

(Any additional remarks will be welcome)

Streets and Roads (Continued)

New Mexico—Dec. 28, by G. D. Macy, state hy. engr., Santa Fe, grading, drainage structures, 2 bridges, graveling 6.717 mi. NRS 203-D, Sandoval Co., $129,156***grading, drainage structures, selected material surfacing 14.488 mi. NRS 237, Lea Co., $81,675*** grading, crushed base course surfacing 5.205 mi. NRH 165-E, Otera Co., $103,738***grading, crushed gravel surfacing 5.152 mi. NRS 218-A and NRS 218-B, Taos Co., $78,304, for State Hy. Dpt., Santa Fe.

N. Y., Rochester—See "Contracts Awarded."

N. Y., Syracuse—See "Contracts Awarded."

Ohio—O. W. Merrell, dir. Hys., Columbus, cancelled bids to have been opened Dec. 7, concrete paving 2.59 mi., Sect. Higginsport" (part) and "W" (part) Ohio River Rd., Brown Co., $114,973.

Pennsylvania—Dec. 28, at office of S. S. Lewis, secy. Hys., Harrisburg, rein.-con. paving, bituminous surface specification E on stone paving 1,400 ft. hy. also rein.-con. paving, bituminous surface Spec. E on plain concrete paving, drainage on Spurs B and D, 1,614 ft. R-76, Sect. 11, Moon Twp., Allegheny Co., involving 27,993 cu.yd. Class 1 and 400 cu.yd. Class 2 excav.; bituminous surface treated macadam surface course paving 2,222 ft. R-06124, Sect. 2, Perry Twp., Berks Co., 1,030 cu.yd. Class 1, 493 cu.yd. Class 2 and 10,238 cu.yd. borrow excav.; rein.-con. paving 3,352 ft. R-20, Sect. 12, Troy Borough, Troy Twp., Bradford Co., 6,035 cu.yd. Class 1 and 100 cu.yd. Class 2 excav.; dual type paving 5,300 ft. hy. and bituminous surface specification E on native stone or broken stone paving 300 ft. R-35, Southampton Twp., Franklin Co., 14,265 cu.yd. Class 1, 474 cu.yd. Class 2 and 282 cu.yd. borrow excav.; rein.-con. widening 18,293 ft. R-215, Sect. 3, East Lampeter, Leacock and Paradise Twps., Lancaster Co., 4,516 cu.yd. Class 1 and 109 cu.yd. Class 2 excav.; widening 18,609 ft. R-215, Sect. 2, Lancaster Co., 5,534 cu.yd. Class 1 and 917 cu.yd. Class 2 excav.; dual type paving 8,500 ft. R-139, North Annville, South Annville and Annville Twps., R-139, Lebanon Co., 9,197 cu.yd. Class 1 and 490 cu.yd. Class 2 excav.; improving existing pavement, incl. rein.-con. widening, reconstructing 9 to 30 ft. in width, etc., 13,398 ft. hy. and fabrication and erection of 162 ft. plate girder bridge, R-146, Sect. 1-A, Lower Providence Twp., Montgomery Co., 18,830 cu.yd. Class 1 and 2,073 cu.yd. Class 2 excav.; rein.-con. paving 4,925 ft. R-113, Sects. 9 and 9-A, South Strabane Twp., Washington Co., 24,229 cu.yd. Class 1 and 1,194 cu.yd. Class 2 excav.; 4 span, plate girder bridge, rein.-con., 18 ft. wide, incl. rein.-con. arch, 2,970 ft. R-692, Sect. 2, Liberty Twp., Bedford Co., 28,633 cu.yd. Class 1 and 1,828 cu.yd. Class 2 excav.; 3 span through truss bridge, rein.-con. paving 1,400 ft. R-22, Lawrence Twp., Tioga Co., 7,420 cu.yd. Class 1 and 1,450 cu.yd. Class 2 excav.

Vermont—Dec. 28, rein.-con. and asphalt paving 0.5 mi. NRM 82-F, Swanton Village*** grading, drainage, base 0.9 mi. Route 55, P.N. R.S. 173, Salisbury***gravel mixed in place surface course 0.8 mi. Route 116, Bristol. To exceed $50,000.

Virginia—Jan. 3, by State Hy. Dpt., Richmond, macadam paving 0.5 mi. Route 11, NRM 425-H, Fed. Project NRM 420-G, Wythe Co., incl. 4,536 cu.yd. excav.; 1 mi. Route 11, State Project NRM 600-K, Fed. Project NRM 340-B, Rockingham Co., 5,901 cu.yd. excav.; concrete underpass 0.8 mi. Route 58, NRH 0657-CB1, Fed. Project NRH 393E, Nansemond Co., 4,671 cu.yd. excav.; improving 0.03 mi. Route 11, State Project NRH-710B2, Fed. Project NRH 420-H, Washington Co., 350 cu.yd. excav.; constructing 223 ft. bridge over North Anna River, Route 1, State Project NRH 358-B2, Fed. Project NRH 362B, Hanover Co..

Washington—Jan. 3, by L. V. Murrow, dir. Hys., Olympia, concrete and asphaltic concrete paving 0.7 mi. State Rd. 8, Camas, NRM 44, Clark Co.; grading 2 mi. State Rd. 8, Cooks East to Underwood West, 112-E and Underwood vicinity, PWP 81, Skamania Co., incl. 312,740 cu.yd. excav.; grading 1.7 mi. and constructing channel change and bridges on State Rd. 1, Olympia to Nisqually, Sect. 2, 171-C, Thurston Co., 702,720 cu.yd. excav.

Wash., Dayton—Dec. 29, by Comrs. Columbia Co., grading, draining, crushed rock surfacing on Secondary Hy. 15, incl. 10.240 cu.yd. Class "A" and 3,180 cu.yd. solid rock excav.

Wash., Mount Vernon—Jan. 4, by Bd. Comrs. Skagit Co., clearing, grading, drainage, surfacing, bridging Burlington-Butler portion Cascade Pass Hy., near Burlington.

Wash., Port Townsend — Dec. 27, by Bd. Comrs. Jefferson Co., H. E. Anderson, aud. and clk., crushed rock surfacing 1.56 mi. Secondary Hy. Project 10, part Chimacum-Hadlock Rd.

Wisconsin—Dec. 28, by State Hy. Comn., Milwaukee, concrete paving 1.708 mi. Green Bay-Oneonto-Marinette Rd., Hys. 14 and 41, NRH 392-J, Brown Co., incl. 13,370 cu.yd. earth, 466 cu.yd. loose rock and 1,590 cu.yd. solid rock excav.; 1.489 mi. Green Bay-Sturgeon Bay Rd. Hy. 54, NRH 466-E, Brown Co., 36,353 cu.yd. earth, borrow, marsh channel, and 2,106 cu.yd. solid rock excav.; 5.342 mi. New Lisbon-Sparta Rd., Hy. 16, NRH 325-B, Monroe Co.; 2.403 mi. Madison-Middleton Rd., Hy. 12, NRM 8-B, NRH 8-A, Dane Co., 7,895 cu.yd. earth and 527 cu.yd. solid rock excav.; 1.236 mi. Merrill-Woodruff Rd., Hy. 51, NRH 431-C, Sect. 3, Lincoln Co.; grading, draining Milwaukee-Chicago Rd., Hy. 41, NRH 238, Racine Co., 184,502 cu.yd. earth borrow and marsh excav.; 3.411 mi. Milwaukee-Chicago Rd., Sect. 1, Contr. 2, NRH 378, Kenosha Co., 120,012 cu.yd. earth borrow and marsh channel excav.; 1.613 mi. same road (Kilbourn Relocation) Sect. 2, Contr. II, NRH 378-F, Kenosha Co., 185,472 cu.yd. earth, borrow and marsh excav.; 3.539 mi. same road, Sect. 3, Contr. II, Kenosha Co., 181,934 cu.yd. earth, borrow and channel excav.; 8.502 mi. Roberts-New Richmond Rd., State Hy. 65, NRS 555-A, St. Croix Co.; 0.924 mi. Clintonville-Oconto Rd., (Clintonville-Belle Plaine), State Trunk Hy. 22, NRH 493-B, Shawano Co., 18,581 cu.yd. earth excav., special ditches; 0.565 mi. Augusta-Cadott Rd., Eau Claire River Bridge approaches, NRS 554-A, Eau Claire Co., 9,328 cu.yd. earth and 8,280 cu.yd. solid rock excav.; graveling 8.502 mi. Roberts-New Richmond Rd., Hy. 65, NRS 555-A, St. Croix Co.; grading, draining, graveling 0.586 mi. Menominie-Cedar Falls Rd., County Trunk Hy. BB, NRS 550-A, Dunn Co., 23,875 cu.yd. earth, 1,805 cu.yd. loose rock and 1,379 cu.yd. solid rock excav.; bituminous surface course on 1.259 mi. Hy. 16-Camp McCoy Rd., NRS 485-A, Monroe Co.

CONTRACTS AWARDED

California — State Hy. Comn., Sacramento, crusher run base surfacing 2.3 mi. hy. between point 3 mi. north of Knights Landing and Robbins, Sutter Co., to A. Teichert & Son, Inc., P.O. Box 1113, Sacramento, $23,920. Bids Nov. 28, awarded Dec. 7.

†Idaho—Pub. Rds., Dpt. Agriculture, Ogden, Utah, grading, draining 6.826 mi. road in Custer Co., to Orino, McHugh & Scioly, Spokane, Wash. $84,903. Est. $86,078. Bids Nov. 16.

Illinois—Dpt. P. Wks. & Buildings, Div. Hys., Springfield, paving 1.08 mi. Madison Co., to Madison Constr. Co., Edwardsville, $63,152*** graveling or crushed stone surfacing 2.25 mi. Gallatin Co. and 3.54 mi. Wayne Co., to Mautz & Oren, Inc., Effingham, $14,882 and $35,160 respectively***5.01 mi. Hamilton Co., to W. H. Laird, Ewing, $49,526***4.58 mi. McDonough Co., to Correy & Collinson, Moline, $24,099*** 5.49 mi. McLean Co., to Berens & Son, Bloomington, $32,568***7.16 mi. Sangamon Co., to Sangamo Constr. Co., Springfield, $34,760*** 3.75 mi. Shelby Co., to H. Reilley, Shelbyville, $19,564***4.62 mi. Warren Co., to F. F. Wier Constr. Co., Moline, $52,800***0.7 mi. Park Ave., and superstructure of bridge on same road, Williamson Co., to Egyptian Constr. Co., Herrin, $16,232 and $27,668 respectively. Grand total $370,411. Bids Nov. 23, awarded Dec. 8.

Illinois—Dpt. P. Wks. & Buildings, Div. Hys., Springfield, concrete paving 0.81 mi. Cook Co., to Stanley Jaicks, Winfield, $20,532; 4.46 mi. Ogle Co., to E. M. Rocho, Freeport, $85,795. Bids Nov. 23.

Illinois—State Dpt. P. Wks. & Buildings, Div. Hys., Springfield, concrete paving 0.02 mi. Staunton Co., to Hartman Clark Bros., Peoria, $810***1.17 mi. LaSalle Co., to Illinois Valley Constr. Co., Ottawa, $41,866***6.28 mi. Henry Co., to Geneva Constr. Co., Aurora, $172,829***5.18 mi. Carroll Co., to Gund, Graham Co., Freeport, $56,685***0.16 mi. Maucopin Co., to H. M. Johnson, Mount Olive, $4,613 ***1.29 mi. Madison Co., to Hanes & Kilgo, Alton, $41,379. Grand total $318,182. Rejected bids Nov. 1, brick paving 0.34 mi. Williamson Co. Bids Nov. 16.

Ill., Bloomington—Dpt. P. Wks. & Buildings, Springfield, treated bituminous surface course on 4.021 mi. Sect. Z-MFT, near Cooksville, McLean Co., to E. Hempstead, Bloomington, $24,605. Bids Sept. 22.

Indiana—State Hy. Comn., Indianapolis, bituminous concrete paving 4.239 mi. Harrison Co., to Meshberger Bros., Stone Co., Linn Grove, $98,629. Est. $116,753. Bids Nov. 27. Noted Nov. 22.

Indiana—State Hy. Comn., Indianapolis, rein.-con. paving 97,243 sq.yd. road in Owen Co., to Grace Constr. & Supply Co., 1810 Lincoln Bank Tower, Fort Wayne, $206,930. Est. $243,506. Bids Nov. 27. Noted Nov. 22.

Indiana—State Hy. Comn., Indianapolis, stabilized material paving on 10.577 mi. Clay and Owen Counties, to Clark, Duvall & Sparling, Flora, $83,329 est. $105,755***grading, crushed stone surfacing 1.655 mi. road in Harrison Co., to A. Siegel, New Albany, $25,383 est. $30,307 ***rein.-con. paving 8.139 mi. Greene and Owen Counties, to Gast Constr. Co., Warsaw, $185,327 est. $223,453***6.154 mi. Jackson Co., to Vinton Constr. Co., 210 Fleming St., Fort Wayne, $157,018 est. $187,623. Grand total $451,057. Bids Nov. 27. Noted Nov. 22.

Indiana — State Hy. Comn., Indianapolis, grading, crushed stone paving 8.056 mi. Harrison Co., 16 ft., to R. Rogers Co., Bloomington, $58,358. Est. $74,321. Bids Nov. 27. Noted Nov. 22.

Ind., Evansville — Vanderburgh Co., E. D. Koenermann, aud., bituminous mulch surfacing 7.5 mi. roads at Cypress, 25 ft., to Globe Constr. Co., Mount Vernon Rd., $25,625.

Ind., Fort Wayne—F. W. Ortlieb, aud., bituminous mulch paving 10.2 mi. roads in Hoagland, 18 ft., to L. W. Dailey, 1034 Oakland St., $35,610.

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†Federal Government.

LOW BIDDER NEWS

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The McGraw-Hill

CONSTRUCTION DAILY

330 West 42nd St., New York

Streets and Roads (Continued)

Ind., Goshen—Elkhart Co., F. C. Mishler, aud., bituminous mulch surfacing 9.1 mi. road at Foraker, 24 ft., to Equipment Constr. Co., Wolf and 13th Sts., Elkhart. $31,000.

Ind., Greenfield — Hancock Co., D. Hitler, aud., bituminous liquid asphalt paving 5.7 mi. roads through Mohawk, 24 ft., to R. Hooton, Maxwell.

Ind., Huntington—Huntington Co., D. W Thompson, aud., bituminous mulch surfacing 8.9 mi. roads at Rock Creek, 22 ft., to C. B. Tharp, 253 Wright St., $29,516.

Ind., Logansport—Cass Co., M. Flory, aud., bituminous mulch surfacing 8 mi. roads, 22 ft., to L. E. Wickersham, 206 4th St., $27,300.

Ind., Muncie—Delaware Co., W. M. Shafer, aud., bituminous mulch surfacing 9 mi. road at Gaston, 20 ft., to J. F. Gubbins, 610 North Elm St., $30,610.

Ind., Richmond—Wayne Co., W. H. Brooks, aud., bituminous mulch surfacing 8 mi. roads through Jacksonburg, 20 ft., to E. G. DeBolt Co., Richmond, $26,555. Noted Oct. 11.

Ind., South Bend—St. Joseph Co., bituminous mulch surfacing 8.3 mi. roads at Crumstown, 22 ft., to H. W. Reed, Mishawaka, $27,670.

Ind., Terre Haute—Vigo Co., J. M. Propst, aud., bituminous mulch surfacing 8.2 mi. roads at Hutton, 20 ft., to Ainsworth & Son, 1240 Hulman St., $28,210.

Ind., Valparaiso—Porter Co., C. A. Blachy, aud., bituminous surfacing 7.2 mi. roads in Boone Grove, 24 ft., to Gerald McGillicuddy, Valparaiso, $24,400.

Ind., Winamac—Pulaski Co., R. E. Wilson, aud., bituminous macadam paving 8.3 mi. roads through Lawton, 22 ft., to Whipple Bros., Star City, $22,550.

Iowa—State Hy. Comn., Ames, grading 6.773 mi. in Appanoose Co., to G. H. Lowe, Cedar Rapids, $36,679. Bids Dec. 4. Noted Nov. 29.

Ia., Elkador—Clayton Co., graveling 15.44 mi. secondary road, to H. L. Leas, Monona, $22,520; 15 mi. county trunk road, to E. C. Schroeder, McGregor, $8,010. Bids Dec. 3. Noted Nov. 22.

Louisiana—State Hy. Comn., Baton Rouge, drainage structures and approaches on Lacasin-Welsh Hy., Jefferson Davis Parish, Project 3500-B, to Robinson & Young, Baton Rouge, $14,387•••0.173 mi. Lafayette-Duson Hy., Lafayette Parish, to A. C. Jones, Opelousas, $20,905••• concrete street improvements 0.473 mi. in Ruston, Lincoln Parish, Project 4050, to T. L. James & Co., Inc., Ruston, $37,585. Grand total $72,877. Bids Nov. 22. Noted Nov. 15 and 22.

Massachusetts—Commonwealth of Massachusetts, F. E. Lyman, comr., 100 Nashua St., Boston, bituminous macadam paving 36,662 ft. NRH 250 and NRM 91, Dracut, Methuen and Lowell, to E. H. Lewis, Andover, $278,579. P.W.A. Bids Dec. 4, awarded Dec. 7. Noted Nov. 29.

Mass., Boston—City, C. J. Carven, comr., Dpt. P. Wks., City Hall Annex, sheet asphalt paving Hyde Park Ave. from Walk Hill St., to Cummins Hy., Hyde Park, to M. DeMatteo, 55 Stella Rd., Roslindale, $75,457. P.W.A. Bids Dec. 3, awarded Dec. 13. Noted Nov. 29.

Michigan—State Hy. Dpt., Escanaba, grading, drainage, graveling surfacing 4.348 mi. Ontonagon Co., to L. W. Brumm, Marquette, $95,033. P.W.A. Bids Nov. 23. Noted Nov. 22.

Mississippi — E. D. Kenna, dir. State Hy. Comn., Jackson, grading, drainage structures and bridges, incl. grade separation 1.792 mi. Meridian-Laurel Hy., Lauderdale Co., to Pigford Bros., Meridian, $75,907. Est. $35,000. P.W.A. Bids Dec. 11. Noted Dec. 6.

Mississippi — E. D. Kenna, dir. State Hy. Comn., Jackson, grading, drainage structures, bridges, gravel base course surfacing 1.754 mi. Brookhaven-Wesson Hy., NRH 89-D, Lincoln Co., to Hodgkin-Adams Co., Winchester, Ky., $18,102 est. $30,000; alternate types paving 5.349 mi. Sunflower-Ruleville Hy., NRH 214-B, Parts 1 and 2, Sunflower Co., to Mobile Constr. Co., Mobile, Ala., $104,330 est. $100,000. P.W.A. Bids Dec. 4. Noted Nov. 29.

Miss., Grenada—Mayor and Bd. Aldermen, W. Y. West, city recdr., furnishing all labor and materials for concrete paving, curbing and guttering, storm sewers 7 blocks certain streets and intersections, to Hartman-Clark Bros. Co., Peoria, Ill., $22,818. Est. $23,000. Bids Dec. 3. Noted Nov. 22.

New Jersey—State Hy. Comn., Trenton, grading 9 in. concrete paving 20,863 sq.yd. Monmouth Co., to Warranty Paving Co., East Orange, $102,007. Bids Dec. 10. Noted Nov. 29.

N. Y., Belmont—See "Sewerage and Waste Disposal."

N. Y., Buffalo—Bd. Superve. Erie Co., widening, bituminous macadam repaving 6.277 mi. Harlem Rd., in Amherst, 27 to 30 ft., to E. Cerullo, Depew, $146,333. Bids Oct. 16. P.W.A. Noted Oct. 11.

N. Y., New York—J. J. Lyons, pres. Bronx Boro, Crotona Park, 3rd and Tremont Aves., asphalt paving Hobart and Tibbett Aves., to C. D. Beckwith, Inc., Seneca Ave. and Edgewater Rd., $7,830 and $7,605 respectively••• Grace and Edson Aves., to Venetian Contg. Co., 2 Lafayette St., $6,739 and $6,542 respectively•••regulating Mansion St., to Ammana Contg. Co., 3206 Webster Ave., $2,388 •••Patterson Ave. and Odell Sts., to N. J. Bonomo, 2151 Mapes Ave., $1,544 and $1,241 respectively•••Beach and Gale Aves., to F. Mascali & Sons, 645 East Tremont Ave., $3,255 and $1,615 respectively. Grand total $38,759. Bids Nov. 30.

N. Y., Rochester—City paving Tait Ave., $15,696; Mount Read Blvd., $24,597; Ohio St., $6,840, by day labor. Total $47,133. TERA project. **Maturity early in 1935.**

N. Y., Syracuse—Onondaga Co. Consolidated Wks. Bureau, A. R. Holmes, executive dir., grading, ditching, installing new culverts in Dabell Rd., Van Buren, $19,329; in Geres Lick County Rd., $8,901; and complete seawall at Skaneateles Lake est. $2,227; curbing Burnett Dr., Syracuse, $4,803, day labor.

Ohio—O. W. Merrill, dir. Hys., Columbus, grading, draining, bridging, brick paving 1.039 mi. Guernsey Co., to W. H. Ringwald & Sons Co., 42 East 2nd St., Chillicothe, $92,694. P.W.A. Bids Dec. 7.

Ohio—I. W. Merrill, dir. Hys., Columbus, asphaltic concrete on macadam paving 1.583 mi. Fulton Co., to C. M. Gray, Waterville, $62,332. P.W.A. Bids Dec. 8.

Oklahoma—State Hy. Dpt., Oklahoma City, grading, drainage 4.87 mi. Blaine Co., to J. E. Wanzel, Lawton, $13,451 est. $16,000; 2.348 mi. Nowata Co., to Merveldt & Lawson, El Reno, $29,657 est. $31,000. Bids Dec. 11. Noted Dec. 6.

South Carolina—State Hy. Dpt., Columbia, bituminous surfacing 6.231 mi. Project 346, Sect. B, Jasper Co., to MacDougald Constr. Co., Hemphill Ave., N.W., Atlanta, Ga., $59,713. P.W.A. Bids Nov. 20. Noted Nov. 15.

Tennessee—Dpt. Hys. & P. Wks., Nashville, grading, drainage 4.006 mi. State Hy. 48, State Aid Project 369-F, Lewis Co., to C. G. Kershaw, Martin Bldg., Birmingham, Ala., $33,870••• roadside improvement and planting 5.598 mi. State Hy. 70, NRH 266-A, reopened, Greene Co., to Municipal Paving & Constr. Co., Cotton State Bldg., Nashville, $6,548•••constructing bridge and approaches over Big Creek on State Hy. 56, NRS 275-C, Grundy Co., and grading, drainage structures 1.53 mi. Hy. 53, NRS 293-B, Jackson Co., to Marion Constr. Co., 419 12th Ave. S., Nashville, $17,281 and $30,755 respectively•••grading, drainage structures 8.011 mi. State Hy. 69, NRS 407-B, Hardin Co., to John Oman, Jr., Acklen Park, Nashville, $79,584. Grand total $168,038. P.W.A. Bids Dec. 7. Noted Dec. 11 Daily.

Utah—State Road Comn., Salt Lake City, graveling 2.642 mi. road in Piute and Sevier Counties, to J. W. Whiting, Springville, $8,058 est. $8,010•••concrete surfacing 1.539 mi. Utah Co., to Lamphe, Smith & Stevens, Price, $56,952 est. $65,409•••0.635 mi. Sanpete Co., to O. Nelson, Logan, $34,112 est. $35,041. Grand total $99,122. P.W.A. Bids Dec. 7 and Nov. 30, awarded Dec. 8 and 4.

†**Utah** — Pub. Rds., Ogden, Utah, grading, draining, 1.567 mi. road in Sevier Co., to Gibbons & Reed, 165 South 4th East St., Salt Lake City, $36,189. Est. $43,626. Bids Nov. 16.

Virginia—State Dpt. Hy., Richmond, grading, draining, 2.3 mi. road and 2 bridges in Albermarle Co., to Perkins-Barnes Constr. Co., Blackstone, $29,420•••macadam and surface treating 2.3 mi. Wythe Co., to Pendleton Constr. Co., Wytheville, $59,856•••1.8 mi. and 0.99 mi. Smyth Co., to R. H. Bolling, Norton, $44,931 and $16,021 respectively•••rein.-con. paving 0.98 mi. Dinwiddie Co., to J. P. McGuire Constr. Co., Durham, N. C., $55,360••• 0.4 mi. Warwick Co., to Roberts Paving Co., Salisburg, Md., $14,661•••0.3 mi. Norfolk Co., to Tunstall-Johnson Co., Inc., Norfolk, $6,141 •••straightening and paving South Main St., in Farmville, Price Edward Co., to Draper & McConnell, Roanoke, $14,405. Grand total $240,795. P.W.A. Bids Dec. 4. Noted Nov. 22.

Washington—State Hy. Comn., Olympia, concrete paving 0.127 mi. Walla Walla Co., to J. H. Collins & Co., Walla Walla, $10,988••• grading, crushed stone surfacing 2.896 mi. Spokane Co., to C. A. Power, East 27 8th Ave., Spokane, $48,962•••clearing, grubbing, grading 23.086 mi. Grant Co., to F. J. Haas, Grandview, $106,295. Grand total $166,245. P.W.A. Bids Dec. 4.

†**Washington** — Pub. Rds., Portland, Ore., clearing 3.216 mi. and 10.14 mi. roads in Mount Rainer Natl. Park, to Erickson, Johnson & Smith, Naches, $23,356. Bids Nov. 7. Noted Oct. 25 and Nov. 1.

Wisconsin—State Hy. Comn., Madison, concrete paving 0.896 mi. Sauk Co., to W. M. Conway, 2105 Jefferson St., Madison, $37,192 •••grading, draining 7.6 mi. in Grant Co., to W. W. Magee Co., 118 West Central Ave., St. Paul, Minn., $123,320•••constructing North Rush River Bridge, St. Croix Co., to J. E. Hinman & Son, Glenwood City, $6,851. Grand total $167,363. P.W.A. Bids Dec. 7. Noted Nov. 27.

†*Federal Government.*

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LIGHTER *yet* STRONGER!

Built to stand up under punishment, the new Red Arch buckets for dragline use increase yardage on every pass because all excess weight has been eliminated. They fill quickly, dump freely and cleanly, and balance well. Through sustained tough digging, the famous Red Arch holds its shape and keeps the bucket rigid.

We can recommend a Red Arch bucket well suited to your job.

Bucyrus-Erie Co.

SOUTH MILWAUKEE, WIS.

EXCAVATING, DRILLING AND MATERIAL-HANDLING EQUIPMENT

862

Engineering News-Record

Annual Highway Number

JANUARY 17, 1935

A R B A Report Number

JANUARY 31, 1935

Annual Review Number

FEBRUARY 7, 1935

EARTHWORK, IRRIGATION DRAINAGE AND WATERWAYS

PROPOSED WORK

Colo., Denver—Cherry Creek Flood Control Impvt. Dist., being organized. Plans under way, will call for bids about March. $794,000.

Colo., Las Animas—Directors Bent Co., irrigation project and Carey Dam. P.W.A. has withdrawn loan and grant of $550,000 because present bond holders refused to give P.W.A. first lien. Noted July 19.

La., Plaquemine—Iberville Mfg. Co. applied to U. S. for permission to construct timber piling bulkhead 129 ft. long on left bank of Bayou Plaquemine, 2.5 mi. below here.

Ohio—Scioto-Sandusky Conservancy Dist. established Dec. 3, H. A. Smith, pres. of Smith Agricultural Chemical Co., Columbus, E. F. Bearce, mgr. Chillicothe Paper Co., Chillicothe, R. B. Smith, merchant of Fremont, directors for water conservation and flood control in Scioto and Sandusky River Valleys. Preliminary fund $15,000 approved for plans and sketches. Counties included the project in Franklin, Fayette, Sandusky, Seneca, Wyandot, Marion, Delaware, Crawford, Morrow, Union, Madison, Highland, Pickaway, Ross, Pike, Vinton and Scioto. Est. cost $36,000,000. $24,000,000 from Federal Government, $5,000,000 from state and $7,000,000 from participating counties.

Pa., New Cumberland—Village plans diverting channel of polluted stream or piping flow. To exceed $17,500. This will be a RWD project to mature some time in 1935. Funds appropriated for survey.

Tex., Bronte—Coke-Runnels Co. Water Control & Impvt. Dist. 1, c/o R. Kneerim, Bronte, plans dam, reservoir and canal system. $7,500,000. District to be organized in January, 1935. Hawley, Freese & Nichols, Capps Bldg., Fort Worth, engrs.

Tex., Raymondville—Willacy County Water Control & Impvt. Dist. 1, Raymondville, c/o O. K. Dickinson, pres., final plans complete and in hands of PWA Bd. at Wash., D. C., for 9,600,000 sq.ft. canal lining, probably concrete or gunite, 150 mi. underground cement pipe, 16- to 84-in., 7,700,000 cu.yd. earthwork, 10,500 cu.yd. structural concrete, 286 relift and small pump units, large river pumping plant, gates and checks and other structures. $4,853,000. Authority for calling for competitive bids within 60 days will be issued soon. Bidding contractors will be required to go over the grounds of the project and thoroughly familiarize themselves with all conditions, etc., prior to bidding. P. A. Welty, 1111 Fair Bldg., Fort Worth, engr. Noted Oct. 18.

BIDS ASKED

†**Ia., Guttenburg**—Jan. 9, by U. S. Eng., Federal Bldg., Rock Island, Ill., constructing Dam 10 on Mississippi River, incl. movable gate section, concrete spillway section, and earth dikes, incl. cofferdams, excavation and fill for complete structures, concrete masonry, roller gates and tainter gates, service bridge, service bridge extension, operating machinery, electric motors, but not electric wiring or control equipment for roller and tainter gates, operating house for roller gates, miscellaneous metal work, stone protection, etc. Noted Oct. 4.

†**Louisiana**—Dec. 27, by U. S. Eng., New Orleans, constructing 2,835 lin.ft. creosoted support for timber spur dikes 35 ft. long and timber spur dikes and fascine willow mattress in Southwest Pass of Mississippi River, in Plaquemine Parish.

†**Minn., St. Paul**—Dec. 28, by U. S. Eng., D. F. Johns, dist. engr., 615 Commerce Bldg., traveling tainter gate hoists for Lock and Dams 4 and 5, in Mississippi River, at Alma, Wis. and Minneiska, Minn., respectively.

†**Oregon** — Jan. 7, by Bureau Reclamation, Ontario, earthwork, tunnels and structures, South Canal, Stas. 2 to 736, Succor Creek Div., Owyhee Project, Oregon-Idaho, incl. 920,000 cu.yd. all classes excav. for canal; 12,300 cu.yd. all classes excav. for structures; 11,570 cu.yd. tunnel excav., Spec. 607.

†**Texas**—See "Contracts Awarded."

†**Tex., Freeport**—Jan. 7, by Treas. Dpt. at office Sup. Archt., Wash., D. C., repairing northeast jetty, Freeport Harbor.

†**Wis., Trempealeau**—Dec. 27, by U. S. Eng., St. Paul, Minn., clearing land above Mississippi River Lock and Dam 6 here.

†**Puerto Rico, San Juan**—Jan. 7, by U. S. Eng., Puerto Rico Dist., 39 Whitehall St., New York, or Arsenal Bldg. 1, San Juan, dredging 1,597,000 cu.yd. material in San Juan Harbor.

CONTRACTS AWARDED

Conn., New Britain—City, widening 7,000 ft. Willow Brook to uniform width of 25 ft. employ 2 daily shifts 75 men each for 145 days. $2,000 for equipment. Total est. $45,000. FERA labor. G. Molleur, City Hall, engr.

†**Ill., Joliet**—U. S. Eng., Post Office Bldg., Canal and Van Buren Sts., lock control house at Brandon Rd., near here, to E. J. Biggs Constr. Co., 1707 West 83rd St., Chicago, $13,347. Bids Nov. 21. Noted Nov. 15.

†**Ia., Muscatine**—U. S. Eng., Rock Island, Ill., constructing Dam 16, in Mississippi River, near here, to Central Eng. Co., Davenport, $2,053,130. Bids Dec. 4. Noted Nov. 6.

†**Mo., Canton**—U. S. Eng., Rock Island, Ill., furnishing, delivering, installing traveling tainter gate hoist at Dam 20 on Mississippi River, near here, to Link-Belt Co., 300 West Pershing Rd., Chicago, Ill., $20,965. Bids Nov. 27. Noted Nov. 8.

Nebraska—Platte Valley Power & Irrigation Dist., North Platte, earthwork on section of supply canal, to J. A. Terterling & Sons, Boise, Idaho, $94,380•••earthwork on Sect. B of supply canal, to Addison Miller, Inc., 1111 Builders Exch. Bldg., St. Paul, Minn., $137,590 •••constructing sections of supply canal, extending from diversion dam to open cut, to Abel-Dobson, Lincoln, and Mark C. Walker & Son, Omaha, $226,344. Grand total $485,314. P.W.A. Noted Nov. 22, awarded Dec. 7.

N. H., Dover—State, H. Cheney, purch. agt., State House, Concord, furnishing, placing about 11,000 tons stone rip in Bellamy River, to J. Swenson Granite, West Concord, 3,000 tons at $2; 3,000 tons at $2.10; 3,000 tons at $2.20; 2,000 tons at $2.25. Awarded Dec. 10.

N. Y., Syracuse—See "Streets and Roads."

†**Pennsylvania**—U. S. Eng., Pittsburgh, excavating 117,200 cu.yd. to provide navigation channel at Brown Island Pool 10, to Atlas Dredging Co., Pittsburgh, $53,618. Bids Nov. 6. Noted Nov. 26 Daily.

†**Texas**—U. S. Eng., Trust Bldg., Galveston, dredging 153,000 cu.yd. in Turning Basin, Port Bolivar, Channel to Port Bolivar by own forces, $32,000. Bids Nov. 12 rejected. Noted Oct. 25.

Alta., Calgary—Dpt. P. Wks., sheet pile protection wall at Bow River, to Mannix & Owens, Calgary, $59,197.

N. S., Halifax—See "Unclassified."

Ont., Parry Sound—Secretary Dpt. P. Wks., Ottawa, dredging in narrows, to Randolph Macdonald Co. Ltd., 1130 Bay St., Toronto, $63,000. Noted Oct. 18.

FEDERAL POWER COMMISSION

Applications for Licenses and Permits
Licenses

1293—J. A. Santoll, Rainbow, Ore., wants license, constructing power project on east Fork of Mill Creek, a tributary of Willamette River in Lane Co., Oregon, affecting lands in Willamette Natl. Park.

UNCLASSIFIED

PROPOSED WORK

La., New Orleans — LIGHTING SYSTEM — Public Belt R.R. Co., cancelled contract awarded for completing lighting system of proposed Mississippi River Bridge. Bids Nov. 22. Noted Dec. 13, under "Contracts Awarded."

Mich., Detroit — PARKS — Wayne Co. Rd. Comn., making plans park improvements, incl. storage for canoes, skating pavilion, comfort stations and water and sewer connections in Lola Valley Park, 2 in Middle Rouge Parkway, $25,000.

Neb., Bayard—HYDRO-ELECTRIC DEVELOPMENT—Morrill County Hydro-Electric Co., Bayard, making preliminary survey and study for taking water from North Platte River through Nine Mile Canal and utilizing water from 9 mi. drain and Hoth Canyon drain making 700 kw. generating capacity hydro-electric project. Henningson Eng. Co., 326 Union Bank Bldg., Omaha, engrs.

N. Y., New York — PARK CONCESSION BUILDING—Dpt. Parks, Arsenal Bldg., Central Park, New York, will not construct park concessions and beer gardens, Orchard Beach Rd. and Pelham Park. Project abandoned. Noted Jan. 25.

O., Bellefontaine—RACE TRACK, etc.—Bellefontaine Racing Club, c/o P. J. Reichart, 3513 East 110th St., Cleveland, bids after Feb. 1, general and separate contracts for race track, grand stands, etc. To exceed $40,000. Private plans. Noted Nov. 1.

Tex., Brownwood — PIPE LINE — John W. Moore, Lubbock, plans 771,000 ft. 8 in. steel pipe line from Brown Co. to Kerrville, $1,300,000. W. D. Horan, Amarillo, engr. Hawley, Freese & Nichols, Capps Bldg., Fort Worth, consult. engrs. P.W.A. application being revised.

Wyoming and Montana—RAILWAY—North & South Railway Co., S. D. Canfield, genl. mgr., Salt Creek, Wyo., plans completing 290 mi. railroad from Casper, Wyo., to Miles City. Owner requested R.F.C. loan of $10,000,000.

Ont., Kenora — HYDRO DEVELOPMENT — Hydro Electric Comn. of Ontario, Toronto, plans hydro-development at Lake St. Joseph. To exceed $250,000.

BIDS ASKED

Calif., Oakland—DOCK—City Port Comn. taking bids 300 ft. extension to dock, creosoted apron, concrete bulkhead walls, railroad tracks, etc., Outer Harbor. $150,000. Noted July 19.

Miss., Canton—GAS TRANSMISSION LINE — Dec. 28, by City, C. N. Harris, mayor, constructing gas transmission main about 21 mi. from Jackson to Canton and constructing well, connecting pipe lines and appurtenances, Contr. A, Items 1 and 2; gas distributing system and town border pressure regulating station, here, Contr. B-1; service pipe lines and installing meters and service regulators, Contr. B-2; steel pipe for transmission main from Jackson to Canton, Contr. C; furnishing c.i. pipe and fittings for gas distribution system, Contr. D; valves, gas meters and house service pressure regulators, for gas system, here, Contr. E; furnishing steel pipe and fittings for service line for gas system, Contr. F. $175,000. P.W.A. project. Black & Veatch, Mutual Bldg., Kansas City, Mo., engrs. Noted Aug. 23.

O., Columbiana — PARK DEVELOPMENT — See "Contracts Awarded."

Va., Lambert—COAL PIER—See "Contracts Awarded."

CONTRACTS AWARDED

†**Calif., San Rafael** — MARKER LIGHTS — Con. Q.M., Hamilton Field, installing runway marker lights at Hamilton Field, to Bennett & Taylor, 1978 South Los Angeles St., Los Angeles, $1,332. Bids Nov. 21, awarded Dec. 17.

N. H., Dover—RIP RAP—State, H. Cheney, Purch. agt., 11,000 tons stone rip rap, Bellamy River, to J. Swenson Granite Co., West Concord, $23,400. Bids Nov. 30, awarded Dec. 8.

New York — TRACK BONDING, etc. — Bd. Transportation, J. H. Delaney, chn., 250 Hudson St., New York, furnishing, installing D.C. connection and track bonding for part of Independent System from Concord to Jay Sts. to 6th Ave. and Waverly Pl., to B. T. and J. J. Mack, Inc., 160 Bway., New York, $63,000. Bids Sept. 28. Noted Sept. 13.

O., Columbiana — PARK DEVELOPMENT — Columbiana Park Comn., F. W. Trader, chn., swimming pool and filtration plant at Harvey S. Firestone Park, day labor under supervision of Park Comn. Est. $38,000. This part of project to mature at once. Early in 1935, it is planned to construct stadium, track, rifle range, tennis courts, playgrounds, etc. Total $75,000.

Pa., Connellsville—PARK IMPROVEMENT—U. S., State of Pennsylvania and Fayette Co., building shelter houses, bridge, entrance gate, memorial circle, walks, drives, etc., at National and State Park, Fort Necessity, day labor under supervision of J. A. Topliss, administrator RWD for Fayette Co. $80,000. RWD project approved.

Va., Lambert—COAL PIER—Norfolk & Western R.R. Co., W. P. Wiltsee, ch. engr., Roanoke, coal pier, separate contracts. To exceed $25,000. Owner soon lets contract 800 tons steel.

N. S., Halifax — PIER — Halifax Harbour Comn., E. Hawken, asst. deputy minister, Ottawa, Ont., extending Pier 9 in northeasterly direction about 700 ft., rock filled timber crib foundation, to J. P. Porter & Sons Ltd., St. Catherines, Ont., $300,000. Est. $400,000. Awarded Dec. 5.

Quebec — POWER LINE — Northern Quebec Power Co., Montreal, 11 mi. new power line to run from company's sub-station to Canadian Malartic Gold Mines Ltd., Fournier Twp., initial power requirements about 700 hp. Owner builds.

Que., Montreal—RACEWAYS—Dpt. Marine & Montreal Harbour Comn., reconstructing 8 raceways at Windmill Point Pier, to Atlas Constr. Co. Ltd., Montreal, $165,918. Awarded Dec. 8.

MATERIALS AND EQUIPMENT

PROPOSED WORK

CEMENT—**Los Angeles, Calif.**—Bd. Directors Metropolitan Water Dist., S. A. Joseph, purch. agt., 306 West 3rd St., rejected bids Nov. 27, 200,000 to 800,000 bbl. portland cement, Spec. 80. $350,000-$1,200,000. Noted Nov. 8.

CRUSHED ROCK, etc.—**Los Angeles, Calif.**—City, A. J. Holm, purch. agt. City Hall, rejected bids Nov. 23, 6,500 tons per month of Nos. 2, 3 and 4 crushed rock from date of contract to Dec. 31, 1934, f.o.b. cars on spur at City Asphalt Plant, Spec. 3359. Noted Nov. 22.

RAILS and FASTENINGS—**Chicago, Ill.**—Atchison, Topeka & Sante Fe R.R. Co., C. W. Harris, ch. engr., 80 East Jackson Blvd., plans expending $1,600,000 for 27,292 tons 112 lb. rails and fastenings; also plans purchasing 3,600 hp. diesel-electric engine, three 660 hp. diesel motor cars for passenger service and 1 diesel electric switching engine, also will expend about $2,250,000 in air-conditioning 280 passenger coaches.

CONCRETE PIPE — **Salisbury, Md.** — Mayor and City Council, soon takes bids Contr. 307-M-1, 6,650 lin.ft. 8- to 18-in. concrete or terra cotta pipe, Contr. 308-M-1, 8,150 lin.ft. 6- to 12-in. c.i. pipe, 6½ tons fittings. C. Gardner, Salisbury, engr. P.W.A. project.

†DUMP TRUCKS—**Howe, Neb.**—U. S. Eng., City Bank Bldg., Omaha, did not take bids Dec. 3, renting 13 dump trucks. Will probably readvertise.

TRUCKS—**Jamestown, N. Y.**—Dpt. P. Wks., L. E. Graham, dir., City Hall, plans purchasing two 2 ton trucks.

FIRE FIGHTING EQUIPMENT — **Seneca Castle, N. Y.**—Fire Comn., W. Bruce, chn.,

†*Federal Government.*

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Materials, etc. (Continued)

plans purchasing motorized fire fighting apparatus. $5,000 or more.

BIDS ASKED

†**WINCHES — Wash., D. C.** — Jan. 23 (extended date), by Yards & Docks, Navy Dpt., Wash., D. C., motor and hand operated winches, Spec. 7800.

HOISTING EQUIPMENT, etc.—Linton, Ind.—Linton Summit Coal Co., W. Cunningham, supt., taking bids electric machinery for hoisting 2 new generators, transformers, cables, $20,000.

TRANSMITTER—Shreveport, La.—Jan. 4, by Commission Council, furnishing, installing 100 watt police radio transmitter complete with antenna system, 10 auto receivers, etc.

TURBO-GENERATOR — South Haven, Mich.—Dec. 28, by S. H. Smith, supt. Bd. P. Wks., 200 kw. turbo-generator. Hamilton & Weeber, Grand Rapids, engrs.

†**WIRE ROPE—Vicksburg, Miss.**—Dec. 27, by U. S. Eng., 1,800 lin.ft. wire rope.

†**CABLE — Brooklyn, N. Y.** — Jan. 14, by Signal Supply Officer, Army Base, 58th St. and 1st Ave., 11,200 ft. cable.

PIPE — Rouseville, Pa. — Dec. 31, by C. Arthurs, secy. Borough Council, 130 ft. 12-in. and 511 ft. 24-in. sewer tile pipe, two 24x12-in. wyes, etc. To exceed $1,000.

†**ANCHOR WIRE—Memphis, Tenn.**—Dec. 28, by U. S. Eng., furnishing, delivering 600,000 lin.ft. non-corrosive anchor wire.

†**REINFORCING FABRIC—Memphis, Tenn.**—Dec. 28, by U. S. Eng., Memphis, non-corrosive reinforcing fabric.

†**TWIST WIRES—Memphis, Tenn.**—Dec. 28, by U. S. Eng., 1,200,000 preformed non-corrosive twist wires and 250,000 preformed non-corroaive end twist wires.

†**WIRE ROPE CLIPS**, etc.—**Memphis, Tenn.**—Dec. 28, by U. S. Eng., wire rope clips, U bolts, saddles, nuts.

†**WIRE STRAND—Memphis, Tenn.**—Dec. 28, by U. S. Eng., 900,000 lb. bright steel wire strand.

†**VALVE LOCKS—Huntington, W. Va.**—Dec. 26, by U. S. Eng., 10 valve locks, c.i., for Lock 14, Ohio River.

†**WINCHES—Pearl Harbor, T. H.**—Jan. 23 (extended date), Yards & Docks, Navy Dpt., Wash., D. C., motor and hand operated winches, at Laulaulei, Spec. 7801. Noted Nov. 1.

CONTRACTS AWARDED

PIPE — Grass Valley, Calif. — City Council, 2,250 ft. 10 in. and 950 ft. 8 in. pipe together with fittings, to Alpha Stores, Inc., Grass Valley, $4,695; valves, to Rensselear Valve Co., 55 New Montgomery St., San Francisco, $315. Awarded Dec. 8. Noted Nov. 22.

DRILL STEEL—Los Angeles, Calif.—D. P. Nicklin, purch. agt. Dpt. Water & Power, 207 South Bway., furnishing, delivering as required in lots of 20 tons or more, or in less than carload lots, drill steel, Spec. 1520, during 12 month period, from Nov. 1, 1934, to Crucible Steel Co., 1209 Santa Fe Ave., $13,848. Bids Oct. 30, awarded Dec. 4.

POTENTIAL DEVICES—Los Angeles, Calif.—D. P. Nicklin, purch. agt. Dpt. Water & Power, 207 South Bway., furnishing, delivering 25 resonant type potential devices, f.o.b. cars, Los Angeles, to be used with nominally rated 0.00075 microforad coupling capacitators which are to be installed on 287,000 V. boulder Canyon power transmission line, Spec. 1533, to General Electric Co., 5201 Santa Fe Ave., $19,750. Bids Nov. 8, awarded Dec. 4. Noted Oct. 5.

STEEL WATER PIPE—Los Angeles, Calif.—D. P. Nicklin, purch. agt. Dpt. Water & Power, 207 South Bway., 1,460 lin.ft. electric fusion welded steel water pipe, f.o.b. bidders trucks, Slauson Ave. and Compton Ave., Spec. 1556, to Western Pipe & Steel Co., 5717 Santa Fe Ave., $5,475. Bids Nov. 27, awarded Dec. 4.

STORAGE BATTERY LOCOMOTIVES — Los Angeles, Calif.—D. P. Nicklin, purch. agt. Dpt. Water & Power, 207 South Bway., furnishing, delivering 12 storage battery type locomotives complete with battery boxes and batteries, and 14 additional battery boxes and batteries, Spec. 1521, to Atlas Car & Mfg. Co., $76,934. Bids Oct. 17, awarded Dec. 7. Noted Oct. 4.

STRUCTURAL STEEL SWITCH RACK—Los Angeles, Calif.—D. P. Nicklin, purch. agt. Dpt. Water & Power, 207 South Bway., furnishing, delivering structural steel switch rack for department switching station at Silver Lake, Spec. 1553, to Emsco Derrick & Equipt. Co., 6811 South Alameda St., $16,765. Bids Nov. 27, awarded Dec. 4.

TRANSMISSION LINE HARDWARE — Los Angeles, Calif.—Dpt. Water & Power, 207 South Bway., furnishing, delivering transmission line hardware, overhead, Spec. 1545, to General Electric Supply Co., 385 East 2nd St., $4,704. Bids Nov. 14, awarded Dec. 11.

STEEL FABRIC—Oakland, Calif.—Directors East Bay Municipal Utility Dist., 512 16th St., 300,000 sq.ft. galvanized and welded steel fabric, 2x4 in. weave No. 13 gage (AS and W) both ways, 60 in. width, to California Wire Cloth Co., 587 Mission St., San Francisco, $4,750. Bids Nov. 28, awarded Dec. 7.

PIPE—Red Bluff, Calif.—City Council, 6,000 ft. 12 in. steel pipe for Water Dpt., to Montague Pipe & Steel Co., 1999 3rd St., $4,860 delivered on site. Bids Nov. 26, awarded Dec. 8.

STEEL PIPE—San Francisco, Calif.—T. A. Brooks, city purch. agt., City Hall, to Sloss & Brittian, 1400 Howard St., furnishing 3,000 ft. ¾ in. standard wrought steel galvanized pipe (made in U.S.A.), at 6.05c. per ft.; 35,000 ft. ¾ in. at 4.87c.; 4,000 ft. 1 in. at 8.46c.; 1,000 ft. 1¼ in. at 13.69c.

†**SMALL MOTORS—Wash., D. C.**—Yards & Docks, Navy Dpt., Wash., D. C., small motors in laboratory machines, for extensible building, Dpt. Agriculture, to W. E. Kingswell, 1214 24th St., $15,326. Bids Dec. 3. Noted Nov. 29.

PIPE—Baltimore, Md.—Bd. Awards, 450 tons 6- to 20-in. pipe, to U. S. Cast Iron Pipe Co., Florence, N. J., $28,243. Noted Nov. 28 Daily.

SEWER PIPE—Salisbury, Md.—F. Dryden, Salisbury, engr., terra cotta pipe, to W. L. Gunby, Salisbury, $2,854. Bids Nov. 22. Noted Nov. 15.

FIRE TRUCK, etc.—Tewksbury, Mass.—Commonwealth of Massachusetts, Trustees of State Infirmary, 1 fire truck with hose and accessories at State Infirmary, to Portland Rubber Co., 259 Middle St., Portland, Me., $5,950. **P.W.A.** Awarded Dec. 10.

PUMP—Mankato, Minn.—City, 1,200 g.p.m. deep well pump, to Crane Co., 510 Pike St., $1,467. Bids Nov. 26.

CONCRETE SEWER PIPE — Minneapolis, Minn.—City, 500 lin.ft. 54 in. concrete sewer pipe, to Elk River Concrete Products Co., 712 Builders Exch. Bldg., $5.60 per ft. delivered to ditch. Bids Nov. 28.

TRUCKS—Jackson, Miss.—E. D. Kenna, dir. State Hy. Comn., Jackson, furnishing f.o.b. Jackson, 16 trucks as follows: 4 model 712-2 cu.yd. bodies, to White Motor Co., New Orleans, La.***4 model 7-43 P 3 cu.yd. bodies, to General Motors Truck Co., 424 Girard St., New Orleans, La.***2 model C-60, 3 cu.yd. bodies, to International Harvester Co., 501 North Alexander St., New Orleans, La.***4 Hug model 3 cu.yd. bodies, to Darympie Equipment Co., Amory. Noted Nov. 29.

†**HEATING EQUIPMENT—Montana—U. S. Eng., Kansas City, Mo.**, heating equipment, Item 1, to Eclipse Eng. Co., Rockford, Ill., $324 ***Items 2 and 3, to Sullivan Valve Eng. Co., Butte, $30***Item 4, to H. M. Sheer Co., Quiney, Ill., $26***Item 5, to Young Radiator Co., Racine, Wis., $55***Item 6, to American Blower Corp., 311 Mutual Bldg., Kansas City, Mo., $10***Item 7, to H. H. Wright Heating Equipment Co., 6161 City Bank Bldg., Kansas City, Mo., $152***Item 8, to Pacific Gas Radiator Co., Huntington Park, Calif., $48. Grand total $645. Est. $1,100. Bids Nov. 28, awarded Dec. 11.

†**LAND PIPE ELBOWS — Montana** — U. S. Eng., Kansas City, Mo., 4 lots land pipe elbows and connecting links for dredges at Fort Peck Dam, to McClintic Marshall Corp., Bethlehem, Pa., $9,424. Est. $4,000. Bids Dec. 8, awarded Dec. 14.

†**STEEL WINDOW FRAMES — Montana**—U. S. Eng., Kansas City, Mo., steel window frames, glass and operator for monitor windows for two 80 ft. runs, Lot 1, to Campbell Metal Window Corp., Bush and Hamburgh Sts., Baltimore, Md., $473; Lot 2, to Gate City Glass & Paint Co., 508 Wyandotte Ave., Kansas City, Mo., $193. Est. $1,200. Bids Nov. 26.

†**SUCTION PIPE FITTINGS — Montana** — U. S. Eng., Kansas City, Mo., suction pipe fittings for Fort Peck Dam, to National Erie Corp., 16th and Raspberry Sts., Erie, Pa., $8,630. Bids Nov. 20, awarded Dec. 5.

†**SUCTION PIPE LINE — Montana** — U. S. Eng., Kansas City, Mo., 4 cast steel flap valves for 28 in. suction pipe line for Fort Peck Dam, to Ellicott Machine Corp., 611 Bush St., Baltimore, Md., $2,769. Bids Dec. 6.

TRUCKS—Omaha, Neb.—City, City Hall, 2 G.M.C. trucks, to A. Murphy & Sons, 1042 Jackson St., at $528.03 each. Noted Nov. 1.

LIGHTING EQUIPMENT—New York—Bd. Transportation, J. H. Delaney, chn., 250 Hudson St., New York, lighting equipment for station and tunnels, etc., on Fulton Street Line, to Jandous Electric Equipment Co., 210 East 40th St., New York, $258,700. Bids Nov. 16. Noted Nov. 1.

TURNSTILE EQUIPMENT—New York—Bd. Transportation, J. H. Delaney, chn., 250 Hudson St., New York, furnishing, installing turnstile equipment on Line A and B of Independent System, to Perey Mfg. Co., 101 Park Ave., New York, $53,539. Bids Oct. 16. Noted Oct. 1.

†**WHIRLER DERRICK BOAT—Cleveland, O.**—U. S. Eng., Federal Bldg., Buffalo, N. Y., constructing and delivering afloat one 25 ton whirler derrick boat, to Treadwell Co., Easton, Pa., $75,000. Bids Nov. 21. Noted Nov. 1.

†**PILING—Washington**—Bureau Reclamation, 20,000 tons sheet steel piling for cofferdam at Grand Coulee Dam, to Inland Steel Corp., 38 South Dearborn St., Chicago, Ill., $1,250,000. Bids Dec. 6. Noted Dec. 6.

†**STEEL—Milwaukee, Wis.**—U. S. Dpt. Lighthouses, structural steel for tower foundations at Calumet Harbor, to Worden Allen Co., Port Washington Rd., $795***reinforcing steel, to Cunningham-Ortmayer Co., 429 West Michigan Ave., $108. Bids Dec. 7.

PIPE—Racine, Wis.—Bd. Water Comrs., c.i. pipe and fittings, to U. S. Cast Iron Pipe & Fdry. Co., 122 South Michigan Ave., Chicago, Ill., $5,200***sluice gates, to Columbian Iron Wks., 2501 Chestnut St., Chattanooga, Tenn., $1,072. Bids Nov. 20.

TURBO-ALTERNATOR and EXCITER — Guam, M. I.—Yards & Docks, Navy Dpt., Wash., D. C., 1 300 kw. turbo-alternator and exciter at Naval Station, Spec. 7835, to General Electric Co., River Rd., Schenectady, N. Y., $18,500. Bids Nov. 28.

FOREIGN

Africa, Liberia—Firestone Tire & Rubber Co., 30 West End Ave., New York, plans service, storage, and processing buildings on rubber plantations, here. To exceed $100,000.

Australia, Maryborough—Wilson K. Hart & Co. Ltd. plans saw mill. $150,000.

Australia, Melbourne—H. J. Heintz Co., Pittsburgh, Pa., plans plant. $500,000. **Maturity 1935.**

Dutch New Guinea—Corporation, c/o Royal Dutch Shell Oil Co., Rotterdam, Netherlands, plans developing oil properties, well drilling, oil storage, service buildings, shops, etc. To exceed $500,000.

Dutch New Guinea—Corporation, c/o Standard Oil Co. of New Jersey, 26 Bway., New York, plans developing oil properties, to exceed $500,000.

England, London — London North Eastern Railway plans track renewals 1935. $2,180,000 appropriated.

England, Richmond—Middlesex Joint Com., plans by H. D. Hay of London, bridge over Thames. $365,000.

Italy—Royal Dutch Shell Petroleum Co., Rotterdam, Netherlands, plans refinery. To exceed $500,000 Permit granted by Italian Government Oil Monopoly, but 70% equipment must be constructed in Italy.

Italy—Socony-Vacuum Oil Co., 26 Bway., New York, plans oil refinery at undisclosed location. Company has been granted part of Italian oil monopoly. To exceed $300,000.

New Zealand, Wellington—Secretary Public Wks. & Tenders taking bids supplying 1,250 suspension insulator strings, complete with fittings, 72 strings, E. H. Strain, Tenders should be cabled before Dec. 18.

Palestine, Haifa—Government takes bids in January, constructing oil berth and reclamation wall. $1,000,000.

Palestine, Hebron — Government preparing plans water supply. $1,500,000.

Palestine, Jerusalem—Government takes bids in January, water supply and drainage system. $2,500,000.

Palestine, Tel Avir—Imperial Airways Ltd. plans airport as link in London-India and South African system. $200,000.

Peru, Lima—Compania Internacional Comercial, S.A., Edificio Weise, Dp. No. 214, Lima, has acquired options on old houses situated in heart of Lima for the purpose of demolishing them and constructing 6 story buildings, $500,000 each. Plan to build 6 buildings during three years, by contracting with foreign financing and construction corporation, paying them off as soon as terminated with proceeds of first mortgages or by selling necessary bonds in United States. L. E. Game, managing dir.

Peru, Lima—William Crosby & Sons, Post Office Box, 2326, interested in prices of rope, customs duty up to 9 mm. dia. S/0.10, over 9 mm. dia. S/0.04; also in prices of lumber of merchantable grades, customs duty S/0.04 per M2. H. Disston & Son, Inv., Phila., Pa., reference.

Rumania, Bucharest—Rumanian Government soon takes bids bridges spanning Danube and Dniester Rivers. Portion of cost to be borne by Bulgarian Government.

Scotland, Edinburgh — John and James Lawrence, Ltd., 74 Eyre Pl., in market for supply of cement roofing material and building board. Customs duty-building board 15-20%; roofing material 10%.

Tasmania, Hobart — Government preparing plans and takes bids early 1935, constructing 88,000 hp. capacity hydro-electric development at St. Clair Lake on Derwent River. $2,945,000.

Union Socialist Soviet Republics — Commissariat of Light Industry, Moscow, or c/o Amtorg Trading Corp., 261 5th Ave., New York, plans 30,000 machine annual capacity typewriter manufacturing plant. $500,000.

Union Socialist Soviet Republics—Commissariat of Heavy Industry, Moscow, or c/o Am-

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†*Federal Government.*

Foreign (Continued)

torg Trading Corp., 261 5th Ave., constructing Mariupol steel mills, by day labor. To exceed $1,000,000.

Union Socialist Soviet Republics — Dpt. P. Parks, Municipality of Moscow, or c/o Amtorg Trading Corp., 261 5th Ave., New York, plans program of park and recreation improvements, in Sokolniki, Izmailov and Ostankino Parks. To exceed $1,000,000.

Union Socialist Soviet Republics—Institute of Natural Resources, Moscow, and Commissariat of Heavy Industry, Moscow, or c/o Amtorg Trading Corp., 261 5th Ave., New York, plans developing sulphur bearing ores on Kola Peninsula. To exceed $500,000. **Maturity indefinite.**

Union Socialist Soviet Republics — Power Trust, Soviet Government, Moscow, or c/o Amtorg Trading Corp., 261 5th Ave., New York, constructing hydro-electric plant, on Gumista River, by day labor. $7,000,000.

DETAILS OF PWA NON-FEDERAL ALLOTMENTS

Loans and Grants Except as Noted. *Grant. †Loan.

KEY TO SYMBOLS

m-meters	c-canal
p-pump	dm-dam
t-tank or standpipe	r-reservoir
f-filtration	tr-treatment plant
d-distr. supt.	b-building
w-well	i-iron removal
s-supply	pw-power line
g-generator	sf-softening
ch-chlorinators	bl-boilers

Water Works

Augusta, Ill., i-r-f-p-t-d	$75,000
Campbellsport, Wis., w-p-t-r-d	74,500
Emery, Utah, s-d	20,000
*Fox Point, Wis., d	21,000
Heber City, Utah, r-s	33,000
Hillsboro, N. Car., f-s-t-d	104,000
McComb, Ohio	57,000
McCrory, Ark., w-p-r-t-d	39,000
*Merriman, Neb., w-p-t-d	6,000
Orem, Utah, d	46,000
Pamplico, S. C., w-p-t-d	28,000
Price, Utah, s	156,000
*Sabetha, Kan., r-tr-eld-s	41,000
Stryker, Ohio, w-p-t-d	58,000

Sewers

*Carpinteria Sanitary Dist., Santa Barbara Co., Calif.	8,000
*Racine, Wis. (storm and combined) also school	210,000
Shrewsbury, Mo.	107,000

Sewers & Disposal Plants

Gary, Ind.	1,400,000
Virginia, Ill.	40,000

Street or Road Const.

Austin, Tex.	150,000
*State of Ill.	209,000

Buildings

*Cincinnati, Ohio (Storage and Garage)	13,600
Hayward, Calif. (Natatorium)	75,000
McGehee, Ark. (Municipal)	39,400
Mena, Ark. (Hospital)	48,200
Trenton, N. J. (Hospital)	407,500
Wadsworth, Ohio (Municipal and Fire Station)	36,000
Woodbine, N. J. (Hospital)	82,500

Schools

Clarkton, N. Car.	27,000
Jasper Co., Tex.	29,000
Liberty Township, Ross Co., Ohio	16,000
Lodgepole, Neb.	53,600
Long Beach, Calif.	113,000
Long Beach, Calif.	115,200
*New Marshfield, Ohio	14,300
*Oakland, Calif.	464,000
*Oakland, Calif.	719,000
Pittsburg Co., Okla.	2,100

Miscellaneous

Chula Vista, Calif. (Park, Swimming Pool)	43,600
*Cincinnati, Ohio (Park improvement)	4,500
Higginsville, Mo. (Park Swimming Pool)	39,300
Miami, Fla. (Harbor Improvement)	520,000
Seal Beach, Calif. (Breakwater)	82,000

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PUBLIC BUILDINGS

PROPOSED WORK

Calif., Berkeley—City plans bond election to finance new schools and additions and improvements to standing school buildings. $449,000. Former bond election failed to carry. Noted Oct. 4.

Calif., Santa Monica—Bd. Educ. plans by Marsh, Smith & Powell, 516 Architects Bldg., Los Angeles, rein.-con. school for John Adams High School, Ocean Park Blvd. and 6th St. $125,000.

†Ill., Chicago—Federal Emergency Administration, Housing Div., H. B. Hackett, Chicago, dir., filed condemnation proceedings against site property bounded by Ogden and Hudson Aves., Division, Halstead, Blackhawk, Siegel and Sedgwich Sts., in Federal Dist. Court by Dpt. Justice, for constructing low cost housing project. $12,500,000.

Ind., Terre Haute—School, J. T. Sankey, 417½ Ohio St., trustee, made plans installing heating plant, 2 pipe vacuum return heating systems, temperature control system stokers, plumbing fixtures. $19,900.

Ia., Sheldon—City plans bond election brick power plant. $240,000. H. L. Cory, Baum Bldg., Omaha, Neb., engr.

†Me., Westbrook—Treas. Dpt. at office Sup. Archt., Wash., D. C., rejected bids Nov. 27, constructing 1 story, basement, 46x68 ft., brick, steel post office, Main St. Will readvertise. Noted Nov. 15.

Mass., Uxbridge—Town, Dpt. Schools, preliminary bids about Dec. 26 to 29, 2 story, basement, 85x175 ft., brick, steel or granite high school or high school addition, $105,000. T. J. Brodeur, 83 Gates St., Worcester, archt. Noted Dec. 13.

Mass., Wellesley—Town, R. E. Blakeslee, chn. Building Com., 3 story, basement, 89x170 ft. high school addition, Kingsbury St. Project in abeyance until March town meeting. Noted Oct. 11.

Mich., Allegan—City plans being completed for municipal dam and hydro-electric power plant for municipal power system, incl. rein.-con. dam across Kalamazoo River and power house. $410,000. Objection and litigation to project have been dropped by Consumers Power Co. P.W.A. project. Ayres, Lewis, Norris & May, Ann Arbor, engrs. Noted Aug. 9.

Mich., Kalamazoo—Kalamazoo Co., plans by M. C. J. Bellingham, Kalamazoo, and Smith, Hinchman & Grylls, Inc., 800 Marquette Bldg., Detroit, and M. C. J. Billingham, Kalamazoo, 4 story, brick, steel, rein.-con. county building, incl. court house, offices and jail. $750,000. P.W.A. project. Noted Sept. 13.

Miss., Jackson—City, election Jan. 19, $1,500,000 revenue bond issue to provide funds for building municipal power plant and distribution system. Noted Aug. 23.

Mo., St. Charles—Wabash R.R. Co., E. L. Crugar, ch. engr., Ry. Exch. Bldg., St. Louis, applied to Interstate Commerce Comm. for permission to obtain a $2,350,000 loan for completing double track rein.-con. steel bridge across Missouri River. P.W.A. project.

N. Y., Auburn—City, K. Bowen, mayor, plans submitting project to voters on bond issue to construct municipal light and power plant, incl. diesel engines and street lighting system. $310,000. P.W.A. loan disallowed. **Maturity 1935.** Burns & McDonnell Eng. Co., 107 West Linwood Blvd., Kansas City, Mo., engrs. Noted Nov. 1.

†N. Y., Big Sandy—U. S. Coast Guard, Wash., D. C., soon takes bids frame buildings for crew quarters. $35,000.

†N. Y., Dobbs Ferry—Treas. Dpt. at office Sup. Archt., Wash., D. C., soon takes bids post office, Main St. $62,000. Site selected.

N. Y., Lockport—City, D. J. Thurston, mayor, plans municipal hydro-electric plant. $908,000. Will submit proposition to voters at November, 1935, election. P.W.A. project. L. A. Harding, Prudence Bldg., Buffalo, engr. Noted Aug. 23.

N. Y., Pine Aire Station—Dpt. Mental Hygiene, State Office Bldg., Albany, rejected bids Nov. 28, assembly hall and farm buildings at Pilgrim State Hospital. Project will be revised. Noted Nov. 22.

†O., Cincinnati — U. S. Government, W. S. Edgemon, Fed. Land Officer, plans underway multiple housing development, West Side, $6,000,000, parks and playgrounds, $1,000,000, c/o Metropolitan Housing Corp., c/o S. Rowe, chn. F. W. Garber, et al., Cincinnati, archt. Fosdick & Helmer, Union Trust Bldg., engrs. Bids Jan. 10 for demolition present buildings. Noted Dec. 13.

Tenn., Tellico Plains—City, 1 story, basement school. P.W.A. loan and grant of $138,700 rescinded as bond issue failed to carry. Noted Aug. 16.

BIDS ASKED

Calif., Los Angeles—Dec. 28, by Bd. Educ., rehabilitation, reconstruction, strengthening administration and auditorium building at William McKinley Junior High School, Vernon Ave. $138,000. D. J. Witmer & L. F. Watson, 816 5th St., archts.

†D. C., Wash.—Jan. 3, by Treas. Dpt. at office Sup. Archt., Wash., D. C., air conditioning, refrigeration, etc., at U. S. Dpt. Agriculture Extensible Building.

†Ga., Covington—Jan. 17, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office. Noted Sept. 13.

†Ill., West Frankfort—Jan. 7, by Treas. Dpt. at office Sup. Archt., Wash., D. C., 1 story, basement, rein.-con., brick post office, $70,400 appropriated. Carter & Drayer, West Frankfort, archts.

†Ind., Aurora—Jan. 8, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office. Noted Aug. 2.

Ind., Terre Haute—Jan. 2, by School Trustees, constructing Highland Township School, $110,000; new heating plant for Ranklin School, $19,900. Miller & Yeager, 200 Opera House, archts.

Ia., Decorah—Bd. Educ. bids about Jan. 2, general contract 2 story, basement, brick, steel, rein.-con. school, plain found. $135,000. P.W.A. project. Bonds sold. C. Altfillisch, Decorah, archt. Noted Nov. 15.

†Kan., Fredonia—Jan. 11, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office.

†Kan., Herington—Jan. 8, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office.

Mass., Grafton—Dec. 28, by Commonwealth of Massachusetts, Dpt. Mental Diseases, State House, Boston, auxiliary piping and wiring for boiler plant alterations and additions at State Hospital. To exceed $17,750. Chas. T. Main, Inc., 201 Devonshire St., Boston, engrs. Part of P.W.A. project. Noted Sept. 14, 1933.

Mass., Westfield—Dec. 27, by Commonwealth of Massachusetts, Armory Comn., State House, Boston, furnishing 2 fuel oil burning systems for heating boilers in State Armory, Franklin St. To exceed $1,000. Part of P.W.A. project A-2, Docket 2415. M. B. Harding, Hampden Natl. Bank Bldg., Westfield, archt. and engr. Noted June 28.

†Mich., Iron Mountain—Jan. 11, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office. Noted June 14.

†Mich., Zeeland—Jan. 11, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing post office. Noted Dec. 14, 1933.

†Mo., Louisiana—Dec. 26, by Treas. Dpt. at office Sup. Archt., Wash., D. C., 1 story, basement, rein.-con., brick post office. $55,000 appropriated. Noted Aug. 9.

N. J., New Brunswick—Jan. 15, by Middlesex Co., constructing tuberculosis hospital, George's Rd. $575,000. P.W.A. project. J. N. Pierson & Son, Metuchen, archts. Noted July 26.

†N. Y., Catskill—Dec. 28, by Treas. Dpt. at office Sup. Archt., Wash., D. C., 2 story, basement, brick, steel post office, plain found., Main St. $68,900. Noted Oct. 18.

†N. Y., Hudson Falls—Jan. 8, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office.

N. Y., Jamaica—Dec. 27, by Dpt. Hospitals, S. S. Goldwater, comr., Municipal Bldg., New York, furnishing, installing lighting fixtures in Queens General Hospital, 164th St. between Goethals Ave. and Grand Central Parkway.

†N. Y., Liberty—Jan. 4, by Treas. Dpt. at office Sup. Archt., Wash., D. C., 2 story, basement, brick, steel post office, plain found., Chestnut St. $75,000.

†N. C., Graham—Jan. 3, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office. Noted Nov. 15.

N. C., Sanatorium—Jan. 2 (extended date), by R. M. Rothgeb, engr., Raleigh, automatic sprinkler system for sanatorium. P.W.A. project.

†Okla., Henryette—Jan. 14, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office. Noted Sept. 6.

†Ore., McMinnville—Jan. 4, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office. Noted Sept. 13.

†Pa., McDonald—Jan. 2, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office.

†Pa., Mount Pleasant—Jan. 15, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office.

†Pa., Norfolk—Jan. 2, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing receiving rooms at U. S. Marine Hospital.

†Pa., Schuylkill—Jan. 11, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office.

†Tenn., Johnson City—Jan. 8, by Vet. Bu., Arlington Bldg., Wash., D. C., electric passenger elevator in Building 8.

Tenn., La Follette—See "Contracts Awarded."

†Tenn., Lewisburg—Jan. 4, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office.

†Tex., Athens—Jan. 7, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office. Noted Mar. 9, 1933.

†Federal Government.

Public Buildings (Continued)

Tex., Austin—Jan. 4, by University of Texas Bd. Regents, c/o J. W. Calhoun, comptroller, Austin, womens dormitory, $198,000; mens dormitory, $210,000, each 3 or 4 story buildings, brick, stone, rein.-con., tile terrazzo and rubber floors, etc. R. L. White, c/o Y.M.C.A. building, archt. P.W.A. projects.

†Tex., Lockport—Jan. 15, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office. Noted Sept. 6.

†Tex., Lufkin—Jan. 17, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office. Noted June 14.

Wash., Seattle — Bd. Regents University of Washington, bids about May 1, infirmary, $200,000. A. H. Albertson, P. Richardson and J. Wilson, Northern Life Tower, Seattle, archts. Noted Nov. 15.

†W. Va., Elkins — Jan. 4, by Treas. Dpt. at office Sup. Archt., Wash., D. C., air conditioning U. S. Post Office, Court House and Custom House.

†W. Va., Richwood—Jan. 4, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office. Noted Sept. 6.

†Wis., Clintonville—Jan. 9, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office.

†Wis., Richland Center—Jan. 10, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office.

Man., Winnipeg—Dec. 27, by Secretary Dpt. P. Wks., Ottawa, Ont., post office addition, $250,000. T. K. Fuller, Dpt. P. Wks., Ottawa, Ont., archt.

LOW BIDDERS

Calif., Oakland—Supervs. Alameda Co., Dec. 12, 12 story, steel, rein.-con. earthquake proof courthouse, 3 lower floors, 176x245 ft. and upper floors 116x116 ft., 12th, Fallon, Oak and 135th Sts., from MacDonald & Kahn, Financial Center Bldg., San Francisco, $1,515,151. Noted Nov. 22.

CONTRACTS AWARDED

†Ala., Russellville—Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office, to Reiling & Dietzen Co., South Pittsburg, Tenn., $34,673. Bids Nov. 30. Noted Nov. 15.

†Calif., Long Beach—Treas. Dpt. at office Sup. Archt., Wash., D. C., finishing interior of 4, 5, 6, 7th floors of post office, to T. A. Beyer Corp., 438 Chamber of Commerce Bldg., Los Angeles, $32,184. Bids Nov. 15. Noted Oct. 18.

Calif., Pasadena—Bd. Educ., reinforcing, altering Longfellow Elementary School, to Taylor & Taylor, 36 North Union St., $128,441. **P.W.A.** Bids Nov. 27.

†Calif., Santa Paula—Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office, to W. L. Snook, 210 LaAreada Bldg., Santa Barbara, $35,800. Bids Dec. 5. Noted Nov. 15.

†Colo., Walsenburg—Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office, to J. H. Marchbank Constr. Co., 205 West Wacker Dr., Chicago, Ill., $40,760. Bids Dec. 3. Noted Nov. 1.

Conn., Collinsville — Town, Bd. Selectmen, steel for 3 story, basement, 60x150 ft. school, Simmons and Dyer Sts., to Porcupine Co., Fairfield Ave., Bridgeport•••heating, to Mayflower Co., Inc., Quistberg St., Hartford•••plumbing, to Byrnes-Milward Co., 28 High St., Hartford •••cast stone and limestone, to Architectural Stone Co., Turners Falls, Mass.•••terra cotta, to N. J. Hollow Tile Co., S. C. Ellis, Newtown St., Middletown, Mass.•••electrical work, to T. C. Dyer, Main St., Canton•••reinforcing steel, to Kalman Steel Corp., 25 Bway, New York •••tile and terrazzo, to Architectural Tiling & Terrazzo Co., 1020 Congress Ave., New Haven. Noted Sept. 20, under "Contracts Awarded."

Conn., Hamden—Industrial Constr. Co., general contractors, 721 Main St., Hartford, granite work for high school, Dixwell Ave., for Town, R. F. Collins, chn. School Comn., to Meehan-Weld, Inc., 15 Clark St., New Britain•••metal doors, to A. R. Kirschner Co., 30 Whitney Ave., New Haven•••iron, to National Iron Wks., Inc., 827 Wondser St., Hartford•••interior brick, to Stiles & Son Co., and F. I. Shares, North Haven•••exterior brick, to Wm. E. Davis & Co., Benton St., Hamden and Montowese Brick Co., Inc., 107 Main St., West Haven•••stone, to C. W. Blakeslee & Sons, Inc., 19 Gibbs St. Noted Sept. 27, under "Contracts Awarded."

Conn., Hartford—City, A. Beach, City Hall, mayor, altering and improving New Park Ave. School, incl. new heating system, $80,000, incl. $42,000 for labor and $38,000 for materials and equipment. Owner builds FERA labor. City will purchase material.

†D. C., Wash.—Treas. Dpt. at office Sup. Archt., Wash., D. C., furnishing, installing signal system, etc., in Dpt. Labor Building, to H. Alexander, Investment Bldg., $52,278.

†D. C., Wash.—Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing laboratory equipment, etc., for Dpt. Justice Building, to Centaur Constr. Co., 210 East 40th St., New York. $61,820. Bids Nov. 22.

†Federal Government.

†D. C., Wash.—U. S. Eng., Navy Bldg., Wash., D. C., constructing temporary building additions to munitions building, to Birchett & Atkins, 1415 K St. N.W., $14,986. Bids Nov. 13. Noted Nov. 8.

†Ill., Chicago—U. S. Eng., constructing lock control house, at Brandon Road Lock on Illinois Waterway, to E. J. Biggs Constr. Co., 1707 West 83rd St., $13,347.

†Ia., Des Moines—Treas. Dpt. at office Sup. Archt., Wash., D. C., installing 2 freight elevators, to Kimball Bros. Co., Council Bluffs, Ia., $8,663. Bids Nov. 5.

Md., Crownsville—Crownsville State Hospital, Baltimore, 3 story, basement administration building, boys' cottage, girls' cottage, connecting passage, etc., to Carlson & Carlson, Annapolis, $314,250. Est. $250,000.

†Mich., Detroit—Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing garage at Immigration Station, to Marlin & Kraumann Co., 955 East Jefferson Ave., $11,066. Bids Nov. 30. Noted Nov. 22.

†Mich., Fremont—Treas. Dpt. at office Sup. Archt., Wash., D. C., demolition of existing structures on site for new post office, to Ames Kimball Co., Grand Rapids, $31,390. Bids Nov. 27. Noted Nov. 8.

†Me., Rockland—Treas. Dpt. at office Sup. Archt., Wash., D. C., extending and remodeling U. S. Post Office, to R. W. Erickson, 119 South 4th St., Phila., Pa., $42,400. Bids Nov. 23. Noted Nov. 1.

Mass., Watertown—Town, C. F. Shaw, chn. Building Comn., Town Hall, 3 story, basement, 65x104 ft., and 1 story, basement, 34x65 ft., brick, cast stone Senior High School addition, concrete found., Common and Columbia Sts., to John F. Griffin Co., 238 Main St., Cambridge, $119,880. Bids Nov. 27, awarded Dec. 12. **P.W.A.** Noted Nov. 29.

Mo., St. Louis—M. I. Fleischer, general contractor, Railway Exch. Bldg., excavating for Peter Herzog School, 2 story, basement, 67x163 ft., 5835 Pamphlin St., to Mills Drayage Co., 2817 Easton St.•••iron and steel, to LaSalle Iron Wks., 3110 La Salle St.•••composition or tile roofing, to South St. Louis Slate & Tile Roofing Co., 5147 Manchester Ave.•••plumbing, to W. L. Ciucas & Co., 11 North Grand St.••• electrical work, to Fremder Electric Co., 5071 Delmar Blvd. **P.W.A.** Noted Oct. 25, under "Contracts Awarded."

Neb., Deshler—Town, municipal light plant addition, electric distribution system, generating machinery and electric switchboard addition, to Fairbanks Morse & Co., 13th & Liberty St., Kansas City, Mo., $54,491.

†N. M., Santa Fe—Treas. Dpt. at office Sup. Archt., Wash., D. C., extending and remodeling U. S. Post Office, to W. F. Stuart, Santa Fe, $16,000. Bids Dec. 6. Noted Nov. 15.

†N. Y., Cobleskill—Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office, to Laucks & Clark Corp., Wallingford, Conn., $34,825. Bids Dec. 6. Noted Nov. 29.

N. Y., Elmira—Dpt. Correction, State Office Bldg., Albany, general contract power house and service connections Elmira Reformatory, to W. E. Wark Co., 6108 Walnut St., Phila., Pa., $176,645•••heating, to Afgo Eng. Co., 142 Fulton St., New York, $239,882 ••• sanitary work, to C. C. Grimm, 239 Delaware Ave., Buffalo, $2,000•••electrical work, to Dwyer Electric Co., Inc., 213 Monroe Ave., Rochester, $124,252•••coal handling apparatus, to McHarg Co., Inc., 1828 Bway., New York, $21,840. Grand total $564,619. **P.W.A.** General contractor awarded contract 350 tons structural steel, to American Bridge Co., Frick Bldg., Pittsburgh, and 100 tons reinforcing steel, to Milton Steel Co., Milton, Pa. Bids Sept. 20. Noted Aug. 23.

†N. Y., Hoffman Island—Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing detention hospital at quarantine station, to Lustig & Weil, Inc., 145 East 32nd St., New York, $25,530. Bids Nov. 30. Noted Nov. 15.

†N. Y., Ithaca—Treas. Dpt. at office Sup. Archt., Wash., D. C., 1 electric freight elevator, to Warsaw Elevator Co., Warsaw, $2,744.

†N. Y., Massena—Treas. Dpt. at office Sup. Archt., Wash., D. C., brick, concrete post office, to Murch Bros. Constr. Co., 4111 Lindell Blvd., St. Louis, Mo., $40,270. Bids Dec. 10. Noted Nov. 29.

N. Y., Monticello—Bd. Educ., general contract 60x200x210 ft. brick, steel high school, to W. L. Crow Constr. Co., 101 Park Ave., New York, $249,107. **P.W.A.** Bids Dec. 7.

N. Y., Monticello—Bd. Educ., plumbing for school, to W. Colquhoun, 5 Wells Ave., Yonkers, $14,500•••heating, to T. G. Egan Refractory Eng. Co., 70 Kane St., Brooklyn, $43,000•••electrical work, to Rao Eng. Co., Inc., 370 Lexington Ave., New York, $13,440. Grand total $70,240. **P.W.A.** Bids Dec. 7.

†Pa., Clarion—Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office, to Wilson Constr. Co., 305 Bedford St., Johnstown, $35,080. Bids Nov. 30. Noted Nov. 15.

†Pa., Emporium—Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office, to Hyde Murphy Co., Ridgeway, Pa., $37,387. Bids Oct. 18. Noted Oct. 4.

†Pa., Mount Joy—Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office, to R. C. Reitz, Rohrerstown, $24,876. Bids Oct. 18. Noted Oct. 4.

†Wis., West Bend—Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office, to K. C. Danielson, Menominee, Mich., $40,827. Noted Nov. 15.

R. I., Exeter—State, Dr. F. J. Farnell, State P. Welfare, general contract 2 story, 55x65 ft., 55x65 ft. and 35x55 ft., brick, limestone, hollow tile hospital buildings, to Hope Building Co., Inc., 36 Exchange Pl., Providence, $99,990 •••heating, to Taylor Heating Co., 714 Broad St., Providence, $9,190•••plumbing, to H. L. Graham & Son, 146 High St., Pawtucket, $11,700•••electrical work, to Scannevin & Potter, 189 Pine St., Providence, $5,260. Grand total $126,140. **P.W.A.** Bids Dec. 1, awarded Dec. 10. Noted Dec. 6.

†Tex., Sabine Pass—Treas. Dpt. at office Sup. Archt., Wash., D. C., 1 and 2 story, basement, brick, steel, quarantine station building, to R. E. McKee, 1916 Texas St., El Paso, $169,300. Bids Dec. 4, awarded Dec. 11. Noted Nov. 16.

†Wis., Jefferson—Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office, to J. P. Cullen & Son, Janesville, $31,605. Bids Dec. 4. Noted Nov. 22.

COMMERCIAL BUILDINGS

PROPOSED WORK

Calif., Oakland—Jurgens Co., c/o H. A. Minton, archt., 525 Market St., San Francisco, making plans 2 story, steel, concrete store and office building, 13th St. and Bway. Est. $125,000 or more.

Conn., New Britain—Daughters of the Immaculate Conception, c/o Rev. L. Bojnowski, New Britain, plans completed by H. F. Ludord, 410 Asylum St., 3 story, basement, 130x220 ft. convent, Burritt St. $200,000. **Maturity in spring.** Noted Oct. 18.

Md., Baltimore — Christ Lutheran Church, J. L. Denton, pastor, plans by P. H. Frohman, 726 Jackson Pl. N.W., Wash., D. C., 3 story, basement, 70x150 ft. parish hall and sunday school building and alterations to existing church, 15 East Hill St. $125,000.

Mass., Wahan (Newton P.O.)—L. F. Silversmith, 2 Pama Gardens, Brighton, plans by C. C. Crowell, 555 Commonwealth Ave., Newton Center, thirty 2 story, basement, brick, stucco and wood residences, Beethoven Ave., also constructing 2 new streets. To exceed $150,000. **Maturity soon.**

N. Y., Brooklyn—Public Realty Co., 204 East 37th St., plans by M. Reiser, 562 East 46th St., group 4 or more 2 story apartments, Avenue P and East 29th St. Est. about $100,000.

N. Y., Brooklyn — Hebrew Old Age Society of Bensonhurst, 1870 76th St., bids late in April, home for aged, 1870 76th St. $125,000. K. Lubroth, 26 Court So., archt. Noted Aug. 30.

N. Y., Gloversville — Shine Chain Theatre Corp., 40 West Main St., plans by T. M. Hulsken & L. T. Strong, 505 Savings Bank Bldg., Lima, O., brick, steel theatre, plain found., Main St. Est. about $105,000.

N. Y., Jamaica—B. H. Sweet, 90-20 161st St., plans group dwellings and 40 acre tract subdivision, Rosedale Gardens. To exceed $100,000. Architect not appointed.

N. Y., Monroe — Allenhaight Realty Corp., A. T. Haigh, pres., Monroe, plans 600 acre tract subdivision and construction of 250 dwellings, golf course, lake, etc. To exceed $100,000.

N. Y., New York—Ancient Order of Scottish Rites, 34th St. and 8th Ave., plans by Murray Klein, 65 Court St., Brooklyn, altering theatre, incl. heating plant, air conditioning, 34th St. and 8th Ave. Manhattan Opera House, Ballrooms and Banquet Halls, Inc., 363 7th Ave., lessee.

N. Y., New York—Excelsior Savings Bank, 221 West 57th St., plans by J. M. Berlinger, 227 East 45th St., altering heating and plumbing in 6 story apartment, 933 Amsterdam Ave. $40,000.

N. Y., New York—Gerry Estate, 270 Bway., plans by R. Candela, 578 Madison Ave., theatre, store, office, 42nd St. and 7th Ave. $150,000. A. Campagna, lessee. Noted Nov. 28.

N. Y., New York—D. Weiss & Son, c/o A. Weiser, archt., 120 East 41st St., plans 6 story, brick, 85x100 ft. apartment, Buhre Ave., near Mahan St. $300,000.

Tex., Victoria—Southwestern Bell Telephone Co., St. Louis, Mo., plans by I. R. Timlin, c/o owner, 2 story, basement, brick, rein.-con. steel, mechanical (operating) and business building, plan installation of mechanical equipment necessary for operating telephones, business offices, basement storage of equipment and supplies. $168,000.

Ont., Ottawa—Imperial Realty Co. Ltd., the Roxborough, Laurier Ave. W., plans new apartment building, Laurier Ave. W., $150,000-$200,000. Architect not appointed.

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Commercial Buildings (Continued)

Que., Verdun—Notre Dame de Lourdes Parish plans by R. Charbonneau, Montreal, school, $320,000.

BIDS ASKED

Ind., Seymour—Jan. 2, by Ball Bros., reconstructing theatre, acoustical treatment, steam heating, interior decoration, plumbing and electrical fixtures. $40,000. R. H. Chatham, Seymour, archt.

Mass., Dedham—Dec. 26 (selected list of bidders), by St. Mary's Roman Catholic Church, 420 High St., 22 story, basement, 65x100 ft., brick, art stone school, concrete found., High St. E. A. Hubbard, Eliot St., South Natick, archt.

N. Y., Brooklyn—See "Contracts Awarded."

N. Y., Brooklyn—F. Savignano, archt., 6005 14th Ave., bids about Jan. 1, general and separate contracts heating alterations in 5 story apartment, Washington and DeKalb Aves., for B. Hoegemann, c/o architect. $30,000. Noted Dec. 13.

CONTRACTS AWARDED

Calif., Oakland—C. Jurgens Co., c/o H. A. Minton, archt., 525 Market St., San Francisco, 2 story, steel, concrete store and office, 13th St. and Bway., to F. A. Muller, Syndicate Bldg., $150,000. Awarded Nov. 7.

Mo., St. Louis—C. H. Schroeder Building & Constr. Co., general contractors, 2806 North Grand Blvd., excavating for Y.M.C.A. building, to Carlo Motor Service Co., 4126 Olive St., for South Side Branch Y.M.C.A., 1528 Locust St. Noted Dec. 20, under "Contracts Awarded."

Mo., St. Louis—St. Gabriel the Archangel, F. H. Skaer, pastor, 5600 Lisette Ave., plumbing for 1 story, basement, 60x110 ft., combination church and school, to Fitzgerald-Glennon Plumbing Co., 454 North Boyle St. Noted Dec. 20, under "Contracts Awarded."

Mo., St. Louis—South Side Branch Y.M.C.A., 1528 Locust St., general contract 2 story, basement, 115x167 ft., brick, steel Y.M.C.A. building, 2806 South Grand St., to C. H. Schroeder Building & Constr. Co., 2806 North Grand St., $118,934 base bid•••heating and ventilating, to Ehrler Heating Co., 2125 Locust St.•••plumbing, to W. L. Clucas & Co., 11 North Grand Blvd.•••electrical work, to Gamp Electric Co., 3614 Delmar Blvd. Noted Nov. 8.

N. Y., Brooklyn—Empire Impvt. Co., 5201 14th Ave., 6 story, brick, apartment, plain found., Avenue T and 31st St., separate contracts, $220,000. Cohn Bros., 191 Joralemon St., archts. Noted Nov. 29.

N. Y., Brooklyn—Godoff Co., 1350 Bway., New York, apartment, 17th Ave. and 49th St., separate contracts, $190,000. H. Rutkins, 1860 Bway., New York, archt. Noted Dec. 5.

N. Y., New York—Daniel Buckley Estate, 331 Columbus Ave., altering heating, plumbing in store and apartment, 331 Columbus Ave., to M. A. Silverman, c/o architect. $60,000. B. L. Swartburg, 2 West 46th St., archt.

N. Y., New York—Granford Realty Corp., I. Zwering, pres., 1070 Andersonn Ave., apartment, Grand Ave. and Fordham Rd., to J. Weiss, 510 East 52nd St. Est. $150,000. Noted Nov. 27.

INDUSTRIAL BUILDINGS

PROPOSED WORK

Ark., Fayette — MACHINE SHOP — W. P. Brown & Sons plan rebuilding machine shop. To exceed $30,000 with equipment. Architect not appointed.

Ind., Cary—FURNACES—American Sheet & Tin Plate Co. making plans building new furnaces. $800,000.

Ky., Latonia—OIL REFINERY—Latonia Refining Co. plans refinery additions. To exceed $100,000.

Me., Portland—PLANT, etc.—New England Grain Co., Hobson's Wharf, plans replacing plant and office building, recently destroyed by fire. To exceed $30,000. Architect not appointed.

Md., Baltimore — SLAUGHTER HOUSE — Schluderberg Kurdle Co., 3800 East Baltimore St., postponed taking new bids until early in spring for 4 story, basement, 50x111 ft. slaughter house, 3800 East Baltimore St. $150,000. Former bids rejected. H. P. Henschein, 59 East Van Buren St., Chicago, Ill., archt.

Md., Finksburg — DISTILLERY — Thomas Ward Distilling Co., plans distillery addition. $40,000.

Mass., Roxbury—WAREHOUSE—United Drug Co., 43 Leon St., soon lets contract 4 story, 90x240 ft. concrete, brick warehouse addition, Leon and Forysthe Sts. To exceed $40,000. Owen Illinois Glass Co., Alton, Ill., lessee. J. E. Deal, 43 Leon Ave., owners engr.

Mich., Battle Creek—DISTILLERY—R. Cummins & Co., plans by L. Roesetti, archt. and engr., 606 Marquette Bldg., Detroit, brick, steel, rein.-con. distillery addition and power house addition, $50,000.

Mich., Detroit — FACTORY — Vickers, Inc., Oakman and La Salle Blvds., 1 story, 100x200 ft., brick, rein.-con., steel pump and valve factory, plain found., Oakman Blvd., to J. A. Utley, 6031 Mansur St. Est. $40,000. Albert Kahn, Inc., New Center Bldg., archts.

Mich., Kalamazoo — FACTORY — Kalamazoo Stove Co., 500 Rochester Ave., 1 story, 110x115 ft., brick, rein.-con. steel stove factory unit, plain found., Rochester Ave., to O. F. Miller Co., Kalamazoo.

Mich., St. Clair—SALT REFINERY—Diamond Crystal Salt Co. plans 1 story, 75x90 ft., and 5 story, 30x120 ft., rein.-con., brick, plain found. $40,000. Private plans. Noted Nov. 22.

Miss., Pelachatchie—LUMBER MILL, etc.—Pearl River Valley Lumber Co., plans lumber mill and power house. To exceed $50,000. Architect not appointed.

N. Y., Buffalo—SERVICE STATION—Goodrich Silvertown Stores, B. F. Goodrich Rubber Co., Akron, O., plans constructing white brick, steel super-service station, 500 gal. steel tanks, Main and North Sts. $35,000.

N. Y., New York—GARAGE—J. McCluskey, 2536 Bathgate Ave., bids after Jan. 7, 2 story, 83x100 ft. garage, Fordham Rd. and Bathgate Ave. $50,000. W. H. Wright, 347 Madison Ave., archt. Noted Sept. 27.

N. Y., New York—GARAGE and SERVICE—Ford Motor Sales Co., 1710 Bway., plans altering garage and service, 233 West 54th St. $28,000 with equipment.

N. Y., Patchogue—STORAGE PLANT—Colonial Beacon Oil Co., 155 East 44th St., New York, bids after Feb. 1, general and separate contracts bulk storage plant. To exceed $40,000. Noted Nov. 22.

O., Barberton — PLANT — Pittsburgh Plate Glass Co. plans plant addition. $40,000.

O., Cincinnati — DEPOT — Cincinnati Union Terminal Co., Freeman Ave., plans altering depot to provide display and exhibits for manufacturers, also assembly, Freeman Ave. $100,000. Architect not appointed. **Maturity indefinite.**

O., Defiance — CANNERY — Franks Canning Co., Montpelier, plans cannery. $30,000 or more.

O., Germantown—POWER HOUSE and DISTILLERY—Germantown Distillery Co. plans by Walker & Norwalk, archts. and engrs., American Bldg., Dayton, altering power house and distillery. To exceed $30,000.

O., Troy — PLANT — Gummed Products Co. plans by J. H. Deekman, Times-Star Bldg., Cincinnati, 1 story plant addition. Est. about $100,000.

Ore., Wauna—TREATING PLANT—Crosett-Western Lumber Co. plans timber treating plant. $45,000.

Pa., Ambridge—FACTORY—Spang-Chalfant Co. soon takes bids 1 story, 60x240 ft. addition to south mill. $40,000. Private plans.

Pa., Mt. Jewett—PLANT—Hutchins Silica & Sand & Clay Co., c/o J. G. Gaffney, Kane, plans clay products manufacturing plant at Hutchins, 6 mi. south of here. To exceed $28,500. **Maturity in 1935.** Architect not appointed.

Tenn., Knoxville — BREWERY — Cumberland Brewing Co., c/o L. Winterman, 3155 Russell St., St. Louis, Mo., plans altering factory and equipping same for brewery. To exceed $130,000.

B. C., Barkerville—POWER PLANT—Cariboo Hydro Electric Power Co. preparing plans development of power project. $1,000,000.

BIDS ASKED

Idaho, Twin Falls—ORE MILL and MINING DEVELOPMENT—See "Contracts Awarded."

Mich., River Rouge (br. Detroit)—FACTORY—Ford Motor Co., Dearborn, taking bids rein.-con. brick factory building and hydro-electric power house on Rouge River, plain found., Newberg Rd. Giffels & Vallet, Marquette Bldg., Detroit, engrs. and archts. Noted Oct. 11.

Miss., West Point—FACTORY—Dec. 28, by A. K. Nangle, secy. Royal Mfg. Co., 2 story, 109x272 ft., brick, steel factory, 60,000 sq.ft. floor space, to be known as West Point Vocational Training School. $75,000. Krouse & Brasfield, Kidder Bldg., Meridian, archts. Noted Sept. 6.

Mo., St. Louis—NEWSPAPER PUBLISHING PLANT—Daily Record Co., H. B. Morris, pres., 1010 Fullerson Bldg., bids about Feb. 1, general contract 3 story, basement, 60x95 ft., brick, steel, 105th and Market Sts. Mauran, Russell & Crowell, 1620 Chemical Bldg., archts.

Mo., St. Louis — MANUFACTURING — See "Contracts Awarded."

N. Y., Buffalo—COLD STORAGE and CREAMERY—See "Contracts Awarded."

Mont., Basin — MINING DEVELOPMENT — See "Contracts Awarded."

O., Youngstown — PLANT — See "Contracts Awarded."

R. I., Providence—SERVICE STATION—See "Contracts Awarded."

CONTRACTS AWARDED

Calif., Oakland—PLANT—McClintic Marshall Corp., 20th and Illinois Sts., San Francisco, and Webster and Tynan Sts., Alameda, reconstructing portion of plant recently destroyed by fire, also 300 ft. wharf, foot of Tynan St., own forces.

Conn., New Haven—FERMENTING UNIT—Hull Brewing Co., 820 Congress Ave., New Haven, 1 story, 30x30 ft., brick, steel fermenting unit, cooling equipment and tank in pent houses, to Fusco & Amatruda Co., Amity Rd. H. H. Davis, 29 Whitney Ave., archt. Noted Nov. 15.

Conn., Torrington—PLANT—Torrington Electric Light Co., 69 Water St., plumbing and heating for 2 story, 50x100 ft., brick, steel power plant addition, Water St., to T. A. Walker, Inc., 22 Migeon Ave. Noted Dec. 6, under "Contracts Awarded."

Idaho, Twin Falls—ORE MILL and MINING DEVELOPMENT—Interstate Mining Corp., T. O. Boyd, pres., ore mill and mining development, vicinity of here, separate contracts and day labor. $350,000 incl. equipment.

Ind., Gary—STEEL PLANT—American Sheet & Tin Plate Co., furnishing, erecting 15,000 tons steel for plant additon, to American Bridge Co., Gary. $1,000,000.

Mich., River Rouge—STEEL MILLS—Ford Motor Co., Dearborn, general contract, not incl. equipment, for cold finishing steel mill, to Bryant & Detwiler Co., Penobscot Bldg., Detroit, total est. incl. equipment $3,460,000. Noted Oct. 11•••general contract for brick, steel, concrete building for hot strip steel mill, to Cooper-Little Co., 5057 Woodward Ave., Detroit; equipment to United Eng. & Fdry. Co., 1st Natl. Bldg., Pittsburgh, Pa., total est. $6,100,000.

Mo., St. Louis—MANUFACTURING—Godefroy Mfg. Co., C. W. Godefroy, pres., 3506A Olive St., 2 story, basement, 45x98x125 ft., brick, steel commercial and light manufacturing building, Olive St. and Theresa Ave. $60,000. C. N. Jacobs, archt., 2121 Gravois Ave., will build by separate contracts.

Mont., Basin — MINING DEVELOPMENT — Basin Gold & Silver Mining Co., developing mining properties in vicinity of here, day labor. $200,000.

N. Y., Buffalo—SUPER-SERVICE STATION—Bardol Co., Inc., Marine Trust Bldg., general contract remodeling brick, timber, Main and North Sts., to Hydro Constr. Co., Mutual Life Bldg., $40,000. Harbach & Kideney, McKinley Bldg., archt.

N. Y., Buffalo—COLD STORAGE and CREAMERY—P. J. Cleary (rep. owner), 195 Scott St., brick, concrete cold storage plant and creamery, Scott St., day labor and separate contracts. $70,000. Noted Aug. 23.

N. Y., Long Island City—FACTORY—Ford Instrument Co., 22-36 47th St., Long Island City, plant, Rawson St., to Wehle Eng. Co., 89-31 161st St., Jamaica. To exceed $50,000. Contractor awarded contract structural steel, to American Bridge Co., 71 Bway., New York. Noted Nov. 29.

N. Y., New York—POULTRY WAREHOUSE—New York State Realty & Terminal Co., 466 Lexington Ave., poultry warehouse, 466 West 13th St., to E. J. Duffy Co., 303 West 42nd St. Est. $40,000 or more. H. Schneiders, 46th and Lexington Ave., archt. New York Dressed Poultry Terminal, Inc., c/o D. P. Kennedy, Montclair, N. J., lessee.

N. Y., Rensselaer—BULK OIL STATION—Atlantic Refining Co., 2605 Broad St., Phila., Pa., structural steel for bulk oil station, to Clausen Iron Wks., Tivoli, Albany•••reinforcing steel, to Strope Steel Co., Albany•••plumbing and heating, to Home Impvt. Co., Albany. Noted Dec. 6, under "Contracts Awarded."

O., Youngstown — PLANT — Republic Steel Corp., plant additon to house electric weld pipe mill, separate contracts. $500,000.

Okla., Yukon—FLOUR MILL, etc.—Dobry Flour Mills Co., Yukon, 1,000 bbl. flour mill and grain elevator, to Jones-Hettelsater Co., Mutual Bldg., Kansas City, Mo., $500,000. Noted Dec. 5.

Pa., Pittsburgh—DAIRY—Isaly Dairy Co., 3380 Blvd. of Allies, general contract brick, steel extension to dairy plant, to Henry Busse Co., 112 Wabash Ave.•••plumbing, to W. N. Sauer Co., 806 Chestnut St. N.S.•••electrical work, to Herbert D. Hale Co., 203 Woodside Rd. Noted Sept. 6.

R. I., Cranston—BOTTLING PLANT—Narragansett Brewing Co., Arlington Sect., structural steel for 2 story, basement, 50x70 ft., rein.-con. bottling plant, to Providence Steel & Iron Co., 27 Sims Ave., Providence; plumbing, to T. R. Douglas, 8 Slocum St., Providence. Est. $40,000. Noted Nov. 29, under "Contracts Awarded."

R. I., Providence—SERVICE STATION, etc.—Tidewater Oil Co., Dexter Rd., 1 story, brick, concrete service station, office and lubritorium, Fox Point Blvd., separate contracts. Private plans.

Tex., Dallas—FACTORY—Pollock Paper & Box Co., 2236 South Lamar St., 1 story, basement, 150x250 ft., steel, brick, rein.-con. addition to paper and box factory, underground tunnel connecting new and old factory, to Cedrick Burger Contg. Co., 3027 Main St. Est. $80,000. S. Biederman, Athletic Club Bldg., archt. R. O. Jameson, S. W. Life Bldg., engr.

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